Definium™ 5000
X-Ray System

Operator Manual

5197809-1EN

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Medical Device Directive

This product complies with the following requirements:

Council directive 93/42/EEC concerning medical devices when it bears the following CE marking of conformity:

The location of the CE mark label on the equipment is in the service system manual.

European registered place of business:

GE Healthcare Europe
Quality Assurance Manager
BP 34
F 78533 BUC CEDEX

Green QSD 1990 Standard issued by MDD (Medical Devices Directorate, Department of Health, UK).

Medical Device Good Manufacturing Practice Manual issued by the FDA (Food and Drug Administration, Department of Health, USA).

Underwriters' Laboratories, Inc. (UL), an independent testing laboratory.

Canadian Standards Association (CSA).

International Electrotechnical Commission (IEC), international standards organization, when applicable.

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Revision History

Rev. #	Date	Pages Affected	Reason for Change
1	25 May 2007	All	Initial release.
2	26 Jul. 2007	A-9, i-i, 2-2, 2-6, 2-8, 2-9, 3-5, 3-9, 3-12, 3-13, 3-15, 3-19, 3-20, 4-2, 4-3, 7-8, 7-15, 10-14, App C	Additions and updates.
3	12 Nov. 2007	2-7, 3-7, 3-13, 3-21, 3-24, 11-6	Additions and updates.
4	13 Feb. 2008	3-13	Added information about default autoposition programs and Table 3-5.
		3-14	Changed step 6 of the Modify Positions section. Added step 7.
		3-18, 3-19	Updated Figure 3-20 with callout. Added row 13 to Table 3-7 to explain SID Change between 100cm and 180cm in over-ride mode.
		3-28	Added row 24 to Table 3-9 for “Physical Limit: Height Maximum. Recalibrate” message.
		4-2, 4-3	Changed system shutdown instructions. Now there are two shutdown options.
		6-12	Added definition of acronym “SPS” to first bullet point at top of page. "Scheduled Procedure Step (SPS)”.
		A-7	Changed step 14.

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Chapter 1: About This Guide

This chapter explains the purpose and design of this Learning and Reference Guide. It is an introduction to the guide, providing information on the purpose, prerequisite skills, guide organization, chapter format, and graphic conventions that identify the visual symbols used throughout the guide.

Topics covered include:

- About the Definium 5000 (p. 1-1)
- Safety Information (p. 1-2)
- Graphic Conventions and Legends (p. 1-2)
- Safety Notices (p. 1-3)

About the Definium 5000

The equipment consists of a Vertical Column and a Swivel Arm with variable height that holds the Tube-Collimator Assembly and the Image Receptor Assembly. It allows radiographic exposures to patients in standing position and sitting or laying over a mobile table.

The Control Panel is ergonomically built, equipped with controls and indicators logically arranged and easily accessible. Duplicate of controls are present at the Image Receptor Assembly for a better accessibility and handling of the equipment in accordance with the movement to be performed.

All the movements of the Swivel Arm are motorized. A soft thumb pressure on the control buttons allows the linear and rotation movements. Undertable and Thorax positioning of the swivel arm is automatically performed by pressing the respective controls.

Figure 1-1 Definium 5000

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Safety Information

Please refer to Chapter 2: Safety and Regulatory in this Learning and Reference Guide. The Safety chapter describes the safety information you and the physicians must understand thoroughly before you begin to use the system. Note that you will find additional safety information throughout your Learning and Reference Guide. If you need additional training, seek assistance from qualified GE Healthcare personnel. The equipment is intended for use by qualified personnel only. This guide should be kept with the equipment and be readily available at all times. It is important for you to periodically review the procedures and safety precautions. It is important for you to read and understand the contents of this guide before attempting to use this product.

Graphic Conventions and Legends

Table 1-1 describes the conventions used when working with menus, buttons, text boxes and keyboard keys.

Table 1-1 Conventions for menus, buttons, text boxes, and keyboard keys

Convention	Description
Select	• Marking an option in a group of check boxes or radial buttons • Choosing an option from a drop-down list • Activating a tab • Highlighting text • Highlighting row items
Press [START EXAM]	Pressing a button on a workstation screen.
In the **Matrix** text box,...	The name of text box in which you can select or type text or the name of a drop-down list from which you select an option.
Type **DICOMAE** in the...	Text you enter into a text box.
Select **Preferences > Worklist**.	The path of selecting option(s) in a tree structure.

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Safety Notices

The following safety notices are used to emphasize certain safety instructions. This guide uses the international symbol along with the danger, warning, or caution message. This section also describes the purpose of a Note.

DANGER: **Danger is used to identify conditions or actions for which a specific hazard is known to exist which will cause severe personal injury, death, or substantial property damage if the instructions are ignored.**

WARNING: **Warning is used to identify conditions or actions for which a specific hazard is known to exist which may cause severe personal injury, death, or substantial property damage if the instructions are ignored.**

CAUTION: **Caution is used to identify conditions or actions for which a potential hazard may exist which will or can cause minor personal injury or property damage if the instructions are ignored.**

IMPORTANT!: An Important notice provides information that does not concern the safety of people or equipment but may effect the internal procedures of your facility or image quality.

NOTE: A Note provides additional information that is helpful to you. It may emphasize certain information regarding special tools or techniques, items to check before proceeding, or factors to consider about a concept or task.

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Chapter 2: Safety and Regulatory

This chapter explains the safety considerations, general equipment and patient related precautions, and the symbols used for the safe operation of your equipment. This chapter also includes information about the emergency procedures.

This chapter presents the concepts necessary to operate your system safely.

Topics covered include:

- Intended Use (p. 2-1)
- X-ray Protection (p. 2-2)
- General (p. 2-2)
- Safety Symbols (p. 2-5)
- Responsibilities (p. 2-7)
- Maximum Permissible Dose (MPD) (p. 2-8)
- Radiation Protection (p. 2-8)
- Monitoring of Personnel (p. 2-9)
- Protection Against Electric Shock Hazards (p. 2-9)
- Protection Against Hazards from Unwanted or Excessive Radiation (p. 2-9)
- Product Identification (p. 2-10)
- Certifications (p. 2-11)
- Classification (p. 2-11)
- Environmental Statement on the Life Cycle of the Equipment or System (p. 2-11)
- Disposal of Waste (p. 2-11)

Intended Use

This system has been designed as a digital imaging system for use in general, emergency and trauma radiography.

The system maintains constant alignment between the x-ray tube and detector. The flexibility of the system makes it ideal for patients in the erect or supine positions, including those in wheelchairs and those with disabilities.

All system movements are motorized.

IMPORTANT!: Only components that are listed by GE for use with the Definium 5000 should be connected to and/or used with the system. Non-system software should not be loaded onto any system computer.

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X-ray Protection

X-ray equipment is dangerous to both patient and operator unless measures of protection are strictly observed

X-ray equipment if not properly used may cause injury. Accordingly, the instructions herein should be thoroughly read and understood before attempting to place this equipment in operation. We will be glad to assist and cooperate in placing this equipment in use.

Although this apparatus is built to the highest safety standards and incorporates a high degree of protection against X-radiation other than the useful beam, no practical design of equipment can provide complete protection. Nor can any practical design compel the operator to take adequate precautions to prevent the possibility of any persons carelessly, unwisely, or unknowingly exposing themselves or others to X-radiation.

It is important that everyone working with X-radiation be properly trained and take adequate steps to insure protection against injury.

The manufacturer assumes that all operator and service personnel authorized to use, install, calibrate and maintain this equipment are cognizant of the danger of excessive exposure to X-radiation, are sufficiently trained and have the required knowledge for it. The equipment herein described is sold with the understanding that the manufacturer, its agents, and representatives are not liable for injury or damage which may result from exposure to X-radiation.

Various protective material and devices are available. It is recommended that such materials and devices be used.

General

Keep this Operating Manual with the equipment at all times and periodically review the Operating and Safety instructions.

WARNING: This X-Ray unit may be dangerous to patient and operator, unless safe exposure factors, operating instructions and maintenance schedules are observed.

To be used by authorized personnel only.

This warning can also be found on the CRIB.

CAUTION: For continued safe use of this equipment follow the instructions in this Operator Manual. Study this manual carefully before using the equipment and keep it at hand for quick reference.

WARNING: Only qualified personnel previously trained in X-ray systems may handle the equipment described in this manual

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WARNING: X-ray equipment is dangerous to both patient and operator unless protection measures are strictly observed.

WARNING: System has moving parts that are controlled by the operator. Be sure all persons and equipment are clear before performing system movement.

WARNING: It is vitally important that everyone associated with x-ray radiation is familiar with the safety and regulatory instructions contained within this manual, in particular the statement at the beginning of this chapter entitled X-ray Protection **(p. 2-2).**

These instructions should be thoroughly read and understood before attempting to place this equipment in operation.

WARNING: The maximum supported weight of each table offered is listed in the table section of this manual. Exceeding this limit can cause equipment damage or injury to the patient.

WARNING: Always assist the patient when getting on and off the table. Also, make sure that all locks are engaged during loading and unloading.

Although X-radiation can be hazardous, X-ray equipment does not pose any danger when it is properly used. Please ensure that all service and operating personnel are properly trained and informed on the hazards of radiation. Those responsible for the system must understand the safety requirements for X-ray operation. Please study this manual and the manuals for each system component to be fully aware of all the safety and operational requirements.

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WARNING: For diagnostic X-ray equipment specified to be used in combination with accessories or other items not forming part of the same; attention to the possible adverse effect arising from materials located in the X-ray beam. Refer to Table 2-1 for maximum attenuation equivalent of possible materials located in the x-ray beam.

Table 2-1 Maximum Attenuation Equivalent mm AL

Item	mm Al
Collimator without spectral filters	2
Collimator spectral filtration of 0.1mm Cu	3.1
Collimator spectral filtration of 0.2mm Cu	4.5
Detector Housing at 100 kV	.9
Image Pasting patient barrier	<0.08
Non-elevating table	<1.05
Non-elevating table with carbon-fiber table top	<1.0
Elevating table with carbon-fiber table top	<1.2

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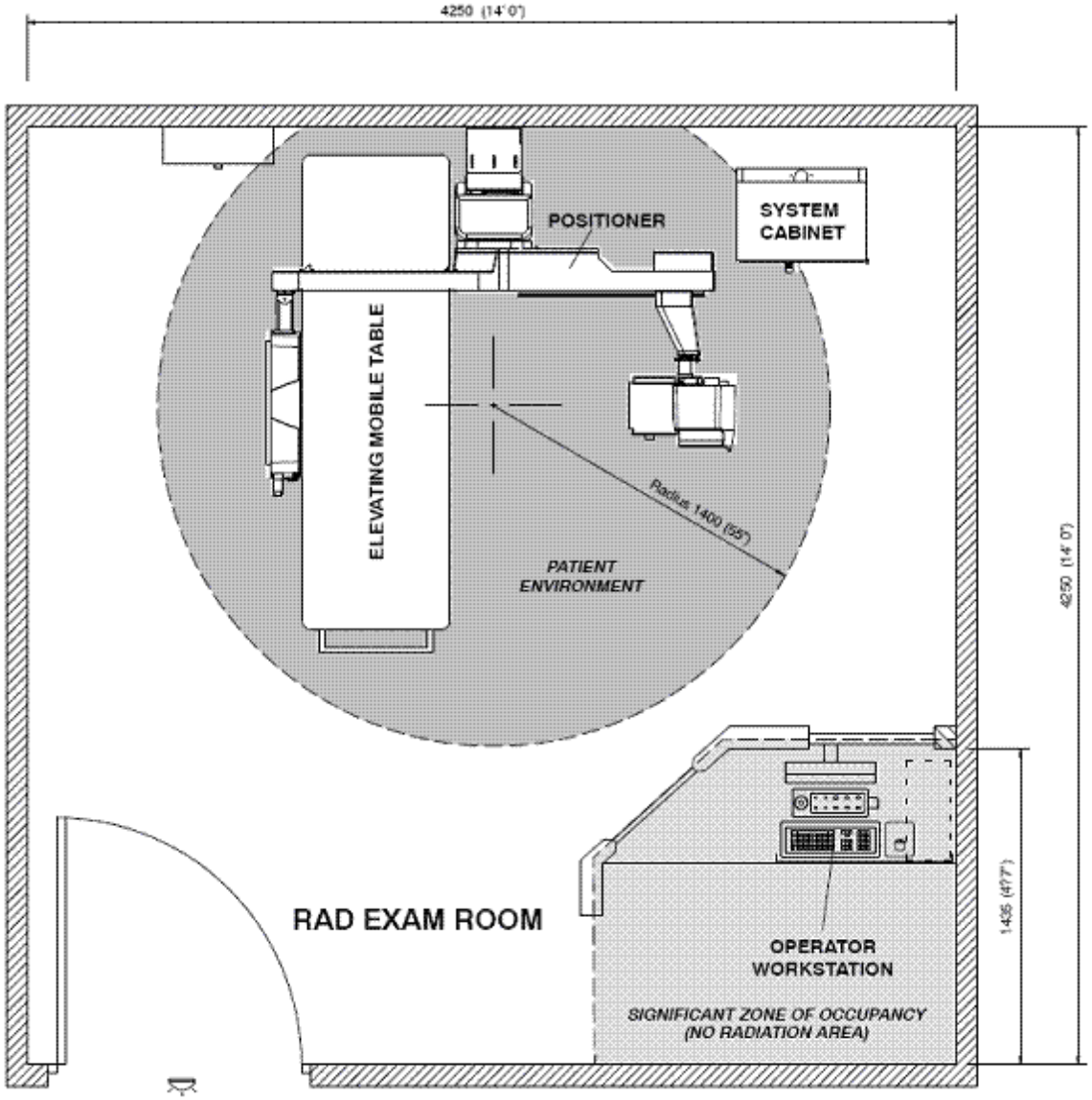
Figure 2-1 Radiation Zone



Safety Symbols

The following safety symbols will be used in the equipment.

Their meaning are described in Table 2-2 below.

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Table 2-2 Safety symbols

Symbol	Description
	Attention, consult accompanying documents.
	Ionizing radiation.
	Laser Radiation. Do not stare into beam. (Only applicable to Collimator with Laser Pointer)
	Type B equipment.
	Dangerous voltage.
	Ground.
	Emergency Stop
	Disposal of Waste. Refer to Disposal of Waste (p. 2-11) for more information.

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Responsibilities

WARNING: **Ensure that all personnel authorized to use the equipment are aware of the danger of excessive exposure to x-ray radiation.**

The equipment herein described is sold with the understanding that the manufacturer, its agents, and representatives are not liable for injury or damage which may result from overexposure of patients or personnel to X-ray radiation.

WARNING: **The patient can roll or fall off the table. Use a safety harness whenever possible. Never leave the patient unattended.**

WARNING: **The manufacturer does not accept any responsibility for overexposure of patients or personnel to x-ray radiation generated by this equipment which is a result of poor operating techniques or procedures.**

No responsibility will be assumed for any equipment that has not been serviced and maintained in accordance with the manufacturer instructions, or which has been modified or tampered with in any way.

WARNING: **It is the responsibility of the operator to ensure the safety of the patient while the x-ray equipment is in operation by visual observation, proper patient positioning, and use of the devices that are intended to prevent patient injury.**

Always watch all parts of the system to verify that there is no interference and no possibility of collision with the patient or with other equipment.

NOTE: The following items can be moved into the patient area:

- Image paste patient barrier
- Elevating table
- Non-elevating table
- Weight-bearing stand

WARNING: **Make sure that the x-ray tube is placed in to working position with the reference axis (X-ray beam) pointing to the reception area.**

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WARNING: Should any interference (EMC) be detected with other equipment, please position other equipment away from this one.

Maximum Permissible Dose (MPD)

Before operation, persons qualified and authorized to operate this equipment should be familiar with the Recommendations of the International Commission on Radiological Protection, contained in Annals Number 60 of the ICRP, with applicable National Standards, and should have been trained in use of the equipment.

WARNING: The operator shall use focal spot to skin distances as large as possible in order to keep the absorbed dose to the patient as low as reasonably achievable.

Radiation Protection

Because exposure to X-ray radiation may be damaging to health, use great care to provide protection against exposure to the primary beam. Some of the effects of X-ray radiation are cumulative and may extend over a period of months or years. The best safety rule for X-ray operator is “Avoid exposure to the primary beam at all times”.

Any object in the path of the primary beam produces secondary (scattered) radiation. The intensity of the secondary radiation is dependent upon the energy and intensity of the primary beam and the atomic number for the object material struck by the primary beam. Secondary radiation may be of greater intensity than that of the radiation reaching the film. Take protective measures to safeguard against it.

An effective protective measure is the use of lead shielding. To minimize dangerous exposure, use such items as lead screens, lead impregnated gloves, aprons, thyroid collars, etc. The lead screen should contain a minimum of 2.0 mm of lead or equivalent and personal protective devices (aprons, gloves, etc.) must contain a minimum of 0.25 mm of lead or equivalent. For confirmation of the local requirements at your site, please refer to your “Local Radiation Protection Rules” as provided by your Radiation Protection Advisor.

WARNING: While operating or servicing x-ray equipment, always keep a distance not less than 2 meters from the focal spot and X-ray beam, protect body and do not expose hands, wrists, arms or other parts of the body to the primary beam.

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Monitoring of Personnel

Monitoring of personnel to determine the amount of radiation to which they have been exposed provides a valuable cross check to determine whether or not safety measures are adequate. It may reveal inadequate or improper radiation protection practices and potentially serious radiation exposure situations.

The most effective method of determining whether or not the existing protective measures are adequate is the use of instruments to measure the exposure. These measurements should be taken at all locations where the operator, or any portion of the body may be exposed. Exposure must never exceed the accepted tolerable dose.

A frequently used, but less accurate, method of determining the amount of exposure is the placement of film at strategic locations. After a specified period of time, develop the film to determine the amount of radiation.

A common method of determining whether personnel have been exposed to excessive radiation is the use of personal radiation dosimeters. These consist of X-ray sensitive film or thermoluminescent material enclosed within a holder that may be worn on the body. Even though this device only measures the radiation which reaches the area of the body on which they are worn, they do provide a reasonable indication of the amount of radiation received.

Protection Against Electric Shock Hazards

This equipment has been classified type-B in accordance with IEC60601-1.

This equipment meet the following Safety Standards: IEC 60601-1, IEC 60601-1-1, IEC 60601-2-32.

DANGER: According to MDD/93/42/CEE, this unit is equipped with EMC filters. the lack of the proper grounding may produce electrical shock to the user.

Protection Against Hazards from Unwanted or Excessive Radiation

Statement of compliance: This X-ray Unit with radiation protection in accordance with IEC 60601-1-3 for which compliance is to be stated.

This equipment meets Standard IEC 60601-1-3 requirements.

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Product Identification

The major items in the equipment have some identification labels attached to them which provide the following manufacturer and product information.

- Product
- Model
- Volts (V), Line Phases, Frequency (Hz), and Power (kVA, kW)
- Date of manufacture
- Serial number
- Reference
- Manufacturer
- Place of manufacture
- Certification

Table 2-3 identifies the type of compliance plates and their location on your system.

Table 2-3 System identification and compliance plates

Component	Plate Type	Component	Plate Type
Carbon fiber fixed table	Identification, HHS, CE, NRTL	GE software	Identification
Collimator	Identification, HHS, CE, NRTL	HV Tank	Identification, HHS, CE, NRTL
X-Ray Tube	Identification, HHS, CE, NRTL	Image Paste Patient Barrier	Identification, HHS
CRIB	Identification, HHS	Ion Chamber	Identification
DAP	Identification, HHS	Laminate fixed table	Identification, HHS, CE, NRTL
Definium 5000 System	Identification, HHS, CE, NRTL	Magic 6400 PC	Identification
Digital Detector	Identification	Installation Dolly	Identification, CE
Elevating table	Identification, HHS, CE, NRTL	X-Ray Generator	Identification, HHS, CE, NRTL
Sedecal Software	Identification		

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Certifications

The X-ray Unit covered by this Operation Manual is authorized to be marked with CE MARKING in accordance with the provisions of the Council Directive 93 / 42 / EEC concerning Medical Devices.

Classification

The X-ray Unit covered by this Operation Manual is classified as:

- Protection against Electric Shock: Class I – Type B applied parts.
- Protection against Harmful Ingress of Water: Ordinary.
- Degree of Safety in the presence of Flammable Anesthetics Mixture with air or with oxygen or with nitrous oxide: Not suitable for use in the presence of Flammable Anesthetics Mixture with air or with oxygen or with nitrous oxide.
- Mode of Operation: Continuous.
- Permanently Installed Equipment.

Environmental Statement on the Life Cycle of the Equipment or System

This equipment or system contains environmentally dangerous components and materials (such as PCB's, electronic components, used dielectric oil, lead, batteries etc.) which, once the life-cycle of the equipment or system comes to an end, becomes dangerous and need to be considered as harmful waste according to the international, domestic and local regulations.

The manufacturer recommends to contact an authorized representative of the manufacturer or an authorized waste management company once the life-cycle of the equipment or system comes to an end to remove this equipment or system.

Disposal of Waste

This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer or an authorized waste management company for information concerning the decommissioning of your equipment.

This product consists of devices that may contain mercury, which must be recycled or disposed of in accordance with local, state, or federal laws. (Within this system, the backlight lamps in the monitor display contain mercury.)

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Emergency Procedures

It is not always possible to determine when some components, such as the X-ray tubes, are nearing the end of their operating lives. These components could stop operating during a patient examination.

WARNING: **WARNING: The facility must establish procedures for handling the patient in case of the loss of radiographic imaging or other system functions during an exam.**

Radio Frequency Interference

NOTE: This equipment generates, uses, and can radiate radio frequency energy. The equipment may cause radio frequency interference to other medical and non-medical devices and to radio communications. To provide reasonable protection against such interference, the Definium 5000 complies with emissions limits for Group 1, Class A Medical Devices as stated in EN 60601-1-2.

There is no guarantee that interference will not occur in a particular installation. If this equipment is found to cause interference (which may be determined by switching the equipment on and off) the user (or qualified service personnel) should attempt to correct the problem by one or more of following measures:

- Reorient or relocate the affected device(s)
- Increase the separating space between the equipment and the affected device
- Power the equipment from a source different from that of the affected device
- Consult the point-of-purchase or service representative for further suggestions

The manufacturer is not responsible for any interference caused either by the use of interconnect cables other than those recommended, or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

To comply with the regulations applicable to an electromagnetic interface for a Group 1 Class A Medical Device, all interconnect cables to peripheral devices must be shielded and properly grounded. Use of cables not properly shielded and grounded may result in the equipment causing radio frequency interference in violation of the European Union Medical Device Directive and of FCC Regulations.

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Chapter 3: System Overview

This chapter describes the system hardware, movement controls, and accessories.

Refer to the Definium 5000 Pre-Installation Manual (part number 5192967-100) for a complete list of specifications, dimensions, and room layout recommendations.

Topics covered include:

- Hardware Overview (p. 3-2)
  - Tube, Arm, and Image Receptor (p. 3-2)
  - Control Room Interface Box (CRIB) (p. 3-5)
  - Hand Switch (p. 3-6)
- System Movements (p. 3-7)
  - System Movement Controls (p. 3-8)
  - Position System from Touch Screen Console (p. 3-11)
  - Emergency Stop (p. 3-15)
  - Anti-collision System (p. 3-16)
  - Modify Positions (p. 3-13)
- Interchangeable Grids (p. 3-17)
- Automatic Collimator (p. 3-18)
  - Tube-Collimator Assembly Positioning (p. 3-20)
- Options and Accessories (p. 3-21)
  - Copper Filtration (p. 3-21)
  - Radiographic Mobile Tables (p. 3-22)
  - Grid and Accessories Holder (p. 3-23)
  - Weight-bearing Stand (p. 3-23)
  - Image Pasting Patient Positioner (p. 3-24)
  - Remote Control (p. 3-25)
  - DAP Meter (p. 3-26)
- Error Messages (p. 3-27)

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Hardware Overview

Tube, Arm, and Image Receptor

Figure 3-1 Definium 5000

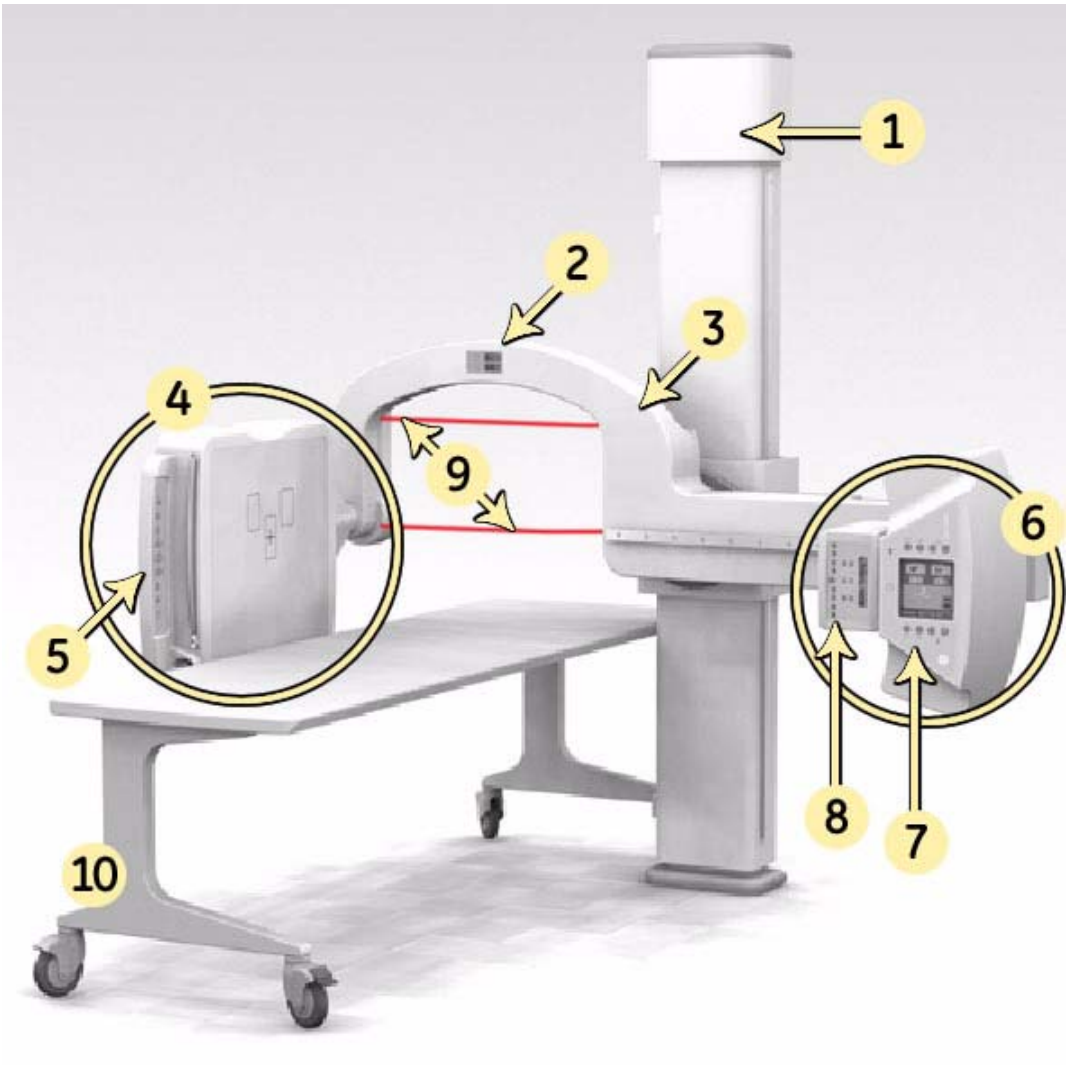

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Table 3-1 System description

Item	Description
1	Column Supports and allows vertical movement of the swivel arm (3), image receptor assembly (4), and tube collimator assembly (6).
2	Arm and detector rotation indicator Shows the angle of the swivel arm (3) and the angle of the detector (4). **Figure 3-2** Arm and detector rotation display
3	Swivel arm Allows the image receptor assembly (4) and tube collimator assembly (6) to move in tandem (Figure 3-3). **Figure 3-3** Swivel arm rotated
4	Image receptor assembly Contains the GE Digital Detector.
5	Control buttons on handle Provides controls to position the swivel arm (3), image receptor assembly (4), and tube collimator assembly (6). Refer to System Movement Controls (p. 3-8) for more information.

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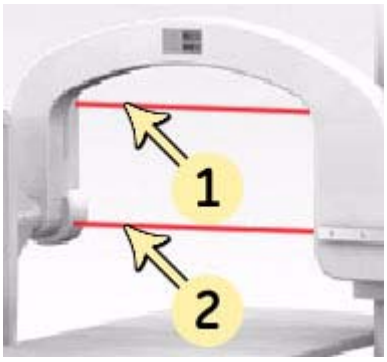
Item	Description
6	Tube-collimator assembly Contains the x-ray tube, collimator, and controls. The tube-collimator assembly is able to move to adjust the SID between the tube and detector. Refer to System Movement Controls (p. 3-8) for more information about system movement controls from the console screen.
7	Control panel Allows control of the system position and exam techniques (generator). Buttons on the control panel are duplicated on the image receptor handle. Refer to Chapter 3: System Overview-System Movement Controls (p. 3-8) for more information.
8	Automatic collimator Refer to Automatic Collimator (p. 3-18) for more information.
9	Safety light beams The two photocell lights on the swivel arm protect the patient and operator from system movement by either slowing or stopping movement when the lights are interrupted. • Beam 1: Disables all movements (except for arm up movement). All movements are enabled once the beam is cleared. • Beam 2: Detects the patient on the table and automatically activates Low Speed movement. Also stops the swivel arm from lowering below the table top and prevents arm rotation. **Figure 3-4** Safety light beams 
10	Radiographic table Supports the patient during the exam. Radiographic table is an optional purchase. Refer to Options and Accessories (p. 3-21) for more information.

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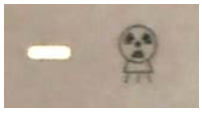
Control Room Interface Box (CRIB)

The Control Room Interface Box (CRIB) (Figure 3-5) contains the power on and power off buttons, an emergency stop button, indicator lights, and movement controls for the system. These functions are described in Table 3-2.

Figure 3-5 CRIB

Table 3-2 CRIB controls

Control	Description
1. Emergency stop button	Immediately stops image exposure and system movement. To release the emergency stop, rotate the knob clockwise (in the direction of the arrow). **NOTE:** After engaging the emergency stop, wait 30 seconds before releasing it. Otherwise, a system error will occur and you will have to reset the system.
2. Power on / off buttons and LED	Controls the power for the entire system. The LED lights up when the power is on.
3. X-ray on LED 	Lights up when x-rays are being emitted, including QAP.

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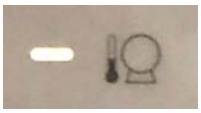
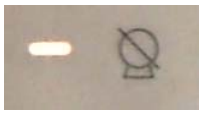
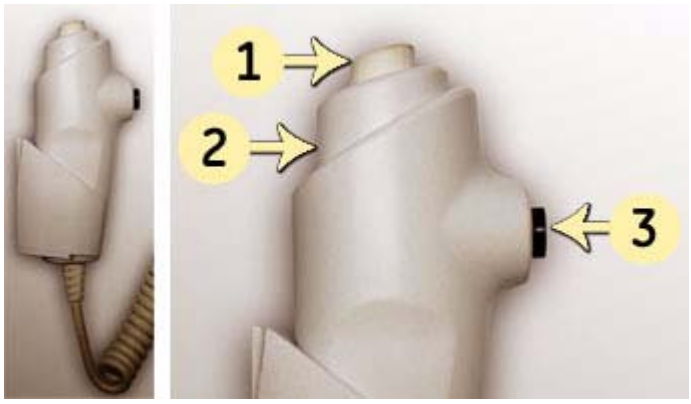
Control	Description
4. Tube temperature LED 	Lights up when the tube is too hot to take exposures. Allow the tube to cool (do not take exposures) until the LED goes out.
5. X-ray inhibited LED 	Lights up when there is some inhibit to taking exposures. Click the Expose Hold button on the Worklist or Acquisition screens for a list of all current inhibits. Refer to Chapter 4: General Information-System Status and Messages (p. 4-7) for more information.
6. System movement controls	Controls system movement for position adjustment. Refer to System Movements (p. 3-7) for more information.
7. Hand switch	Initiates the exposure. Refer to Hand Switch (p. 3-6) for more information.

Hand Switch

Exposures are made with the console hand switch. The Prep/Expose button on this switch has three positions: OFF, PREP, and EXPOSE.

Figure 3-6 Hand switch



1. PREP
2. EXPOSE
3. Collimator Lamp Switch

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Table 3-3 Hand switch button positions

Position	Description
OFF	The OFF position is when no pressure is applied to the Prep/Expose button on top of the hand switch.
PREP	PREP is the next position on the hand switch. When it is partially pressed, it brings the rotor up to speed and heats the filament. The button returns to the OFF position if released.
EXPOSE	The EXPOSE position is when the button on the hand switch is fully depressed. This produces X-rays that are recorded. Release the Prep/ Expose button after the exposure is completed.

System Movements

WARNING: Monitor system movements to avoid any impact of the system with the floor, ceiling, or other objects in the room. Impact may cause serious damage to the equipment.

WARNING: Monitor the patient position (hands, feet, fingers, etc.) to avoid injury to patient caused by unit movements. Patient must be kept away from mobile components of the unit.

Intravenous tubing, catheters, and other patient connected lines should be routed away from moving equipment.

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System Movement Controls

Controls to move and position the system are provided in four places: control panel, receptor handle, CRIB, and a remote control (optional). Table 3-4 shows the symbols on the controls and describes their function.

Figure 3-7 Control Panel, Receptor Handle, Remote Control, and CRIB

Control Panel

Receptor Handle

Remote Control

CRIB

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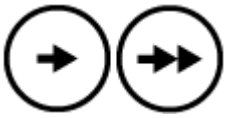
DANGER: **Clear all people and objects away from the swivel arm before attempting any movement.**

Table 3-4 Controls and their functions

Symbol	Description
Move	Begins movement to a position selected from the touch screen console. Press and hold the button until the position is reached. Movement stops if the button is released before reaching the selected position. Press and hold the button to continue. Press the Safety Lock button before the attempting movement, if the Safety Lock is engaged. If system movement remains continuously blocked (the system Safety Lock is activated), press and hold the "Move" button and then press the movement button. Refer to Position System from Touch Screen Console (p. 3-11) for more information.
Safety Lock	Locks or unlocks system movement. Press the Safety Lock button to unlock the system before the attempting movement.
Low / high speed Single button (on receptor and remote control) Two buttons (on CRIB and touch screen console) 	Switches between low and high speed. The default is to move at high speed. • From the image receptor or remote control, press the button to move at low speed. Press again to return to high speed. • From the CRIB, press the button with the single arrow to use slow speed. Press the button with the double arrow to return to high speed. • From the touch screen console, press the button to move at low speed. Press again to return to high speed. **NOTE:** Low/high speed selection does not affect automatic positioning.
Move swivel arm vertically	Moves the swivel arm vertically. Press and hold a button until the desired position is reached. Release the button to stop movement.

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Symbol	Description
Increase / Decrease SID	Adjusts the SID (Source-Image Distance). Press and hold a button until the desired position is reached. Release the button to stop movement. The SID range is between 100 cm (40”) and 180 (72”). Movement stops when one of these detents is reached. The touch screen console indicates the SID position.
Rotate swivel arm	Rotates the swivel arm clockwise and counterclockwise. Press and hold the button until the desired position is reached. Release the button to stop movement. Movement will not be allowed if the system detects that the swivel arm is too close to floor or ceiling to continue without collision. There are detents at 0° and 90°. Movement stops when one of these detents is reached. Press the button again to continue movement. The touch screen console displays the arm angle. **CAUTION: Rotation angle of the Swivel Arm is limited to +120°/-30° from its vertical position (0°).**
Rotate image receptor	Rotates the image receptor. Press and hold a button until the desired position is reached. Release the button to stop movement. This motorized movement allows a maximum of +45° clockwise movement and a minimum of -45° counter-clockwise movement. The rotation detents at 0° and when the receptor is parallel to the floor (180°). Press button and release at desired position. The touch screen console displays the receptor angle.
Automatic undertable position	Moves the system to a pre-defined position for table exams. Press and hold the button until the desired position is reached. Release the button to stop movement. Refer to Position System from Touch Screen Console (p. 3-11) for more information.
Automatic position for upright exams	Moves the system to a pre-defined position for upright exams. Press and hold the button until the desired position is reached. Release the button to stop movement. Refer to Position System from Touch Screen Console (p. 3-11) for more information.

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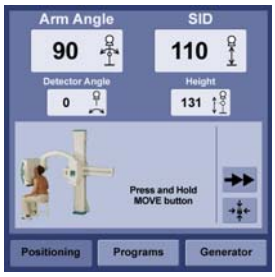
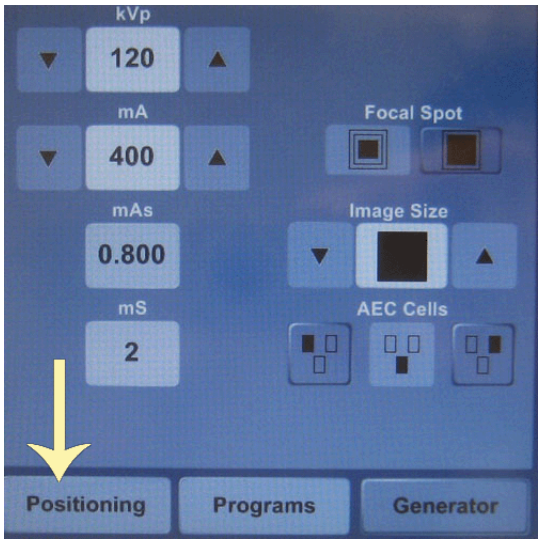
Symbol	Description
Touch screen console 	Displays current system position, allows selection of pre-programed positions, and allows modification of the exam parameters. Refer to Position System from Touch Screen Console (p. 3-11) and Modify Positions (p. 3-13) for more information.
Remote control sensor	Receives the signal from the remote control (optional). Do not block or cover the sensor. The signals from the remote control may not be received.

Position System from Touch Screen Console

Follow this process to use the touch screen console to position the system.

1. Press [POSITIONING] on the screen, if necessary.

Figure 3-8 Touch Screen Console (showing Generator properties)



- The Positioning screen appears (Figure 3-9)

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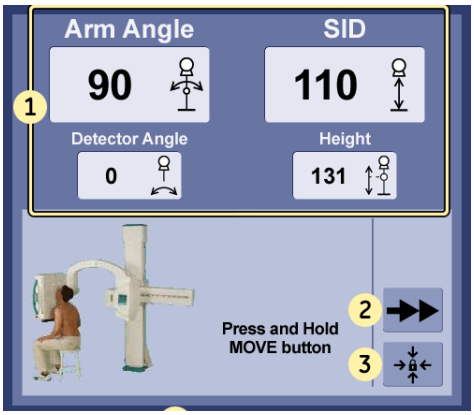
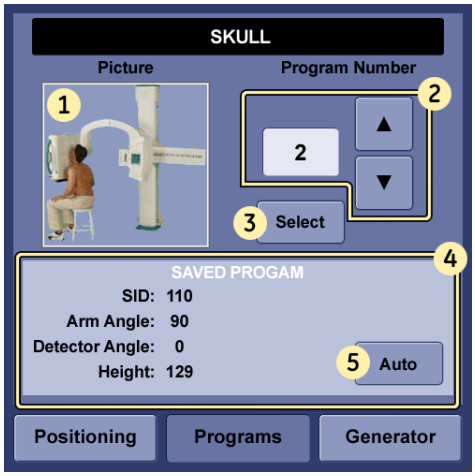
Figure 3-9 Touch Screen Console – Positioning Screen



1. Arm position and SID information
2. Low / High Speed
3. Safety Lock button
4. Access to Programs screen

2. Press [PROGRAMS].
   - The Programs screen appears (Figure 3-10).

Figure 3-10 Touch Screen Console – Programs Screen



1. Reference picture of position number selected
2. Position number
3. Selects the position
4. Positioning data
5. Enable Manual or Auto mode

3. Select the position number with the arrow buttons (2).
4. Press [SELECT].
   - The screen displays positioning data (4).
5. Press and hold the green [MOVE] button on the CRIB, remote control, image receptor assembly or below the control panel touch screen.
   - The unit moves to the selected position.
   - If the console displays an error message and will not move into position, press the [RESET ERROR] button (Figure 3-11) to clear the error and resume movement.
   - The auto or manual mode button allows you to toggle between automatic movement and manual movement.

NOTE: Another way to reset an error is to press the [SAFETY LOCK] button on any control panel.

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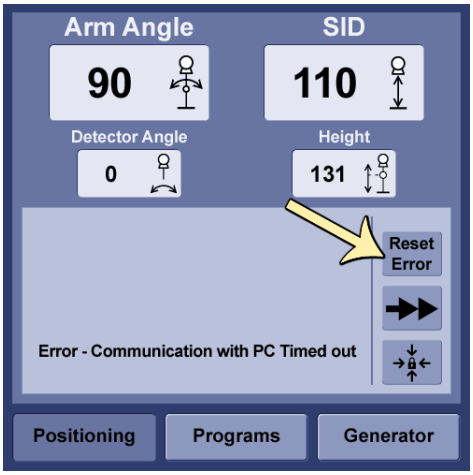
Figure 3-11 Positioning screen with error



Modify Positions

Ten default autoposition programs are provided on your system. See Table 3-5 for details of these programs.

Table 3-5 Default auto position programs

Program Number	Name	SID (cm)	U-Arm Rotation (Degrees)	Detector Angle (Degrees)	Height (cm)
1	KUB	100	0	0	60
2	L5SI SPOT	100	-5	5	60
3	CHEST	180	90	0	120
4	UPRIGHT ABDOMEN	100	90	0	120
5	APC SPINE	100	97	-5	123
6	STANDING KNEE	100	90	0	70
7	HAND/WRIST	100	0	0	70
8	SUNRISE KNEE	100	26	-25	50
9	CROSS TABLE SPINE	100	90	0	75
10	SMV	100	119	0	122

Ninety-nine positions are available. Contact your Field Service Engineer to add new positions.

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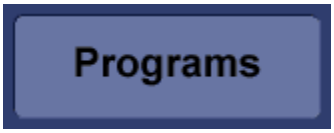
Follow this process to change the settings of a pre-programmed position.

1. On the Programs screen, press and hold the [PROGRAMS] button for 5 seconds.

Figure 3-12 Touch Screen Console – Programs button

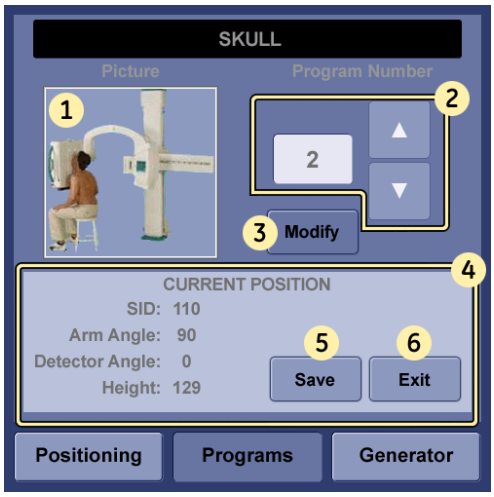


- A virtual keyboard screen appears (Figure 3-13).

Figure 3-13 Touch Screen Console – Password screen

2. Insert the password (1111).
3. Press [OK].
4. Select the Program position number to be modified and Press [MODIFY].

Figure 3-14 Programs modifying



1. Reference picture of the selected position
2. Position number
3. Access to modifying the programmed position
4. Programmed position data
5. Save positioning data
6. Exit from modifying position

5. Move the Arm to the desired position.

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6. Press [PROGRAMS] to return to the previous screen.
   - The screen will show modified position data and the words "Current Position" will be flashing.
7. Press [SAVE].
   - The "Current Position" words will then change to "Saved Program".
8. Press [EXIT] to return to the Programs screen.

Emergency Stop

The unit includes Emergency Stop buttons (Figure 3-15) located on the CRIB, receptor, and system cabinet that immediately stop image exposure and system movement in the event of an emergency.

Press any red Emergency Stop button to stop movement or exposure.

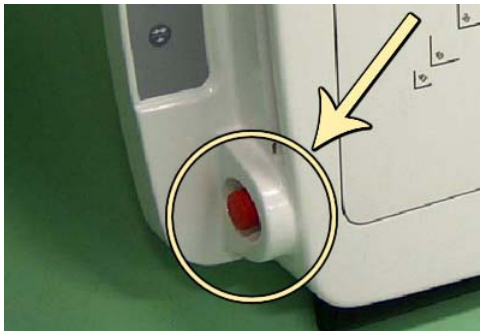
To release the emergency stop, rotate the knob clockwise (in the direction of the arrow).

WARNING: **In the event of an emergency, forcibly press the "Emergency Stop" button on the system cabinet, the receptor, or the CRIB (Figure 3-15).**

NOTE: After engaging the emergency stop, wait 30 seconds before releasing it. Otherwise, a system error will occur and you will have to reset the system.

Figure 3-15 Emergency stop buttons

Receptor



System cabinet

CRIB

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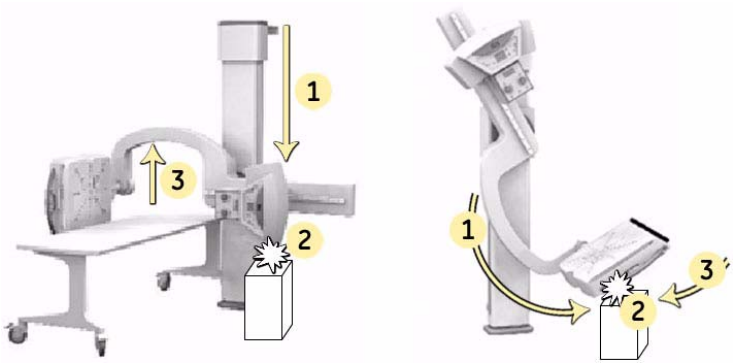
Anti-collision System

In addition to the light beams that slow down the speed or stop motion when the light beam is cut, this unit includes an anti-collision system that will stop or reverse movement if the arm assembly collides with any object.

- When the Arm is moving down or when it rotates, the anti-crushing system will always reverse the movement to avoid any objects between the detector and the floor (Figure 3-16).

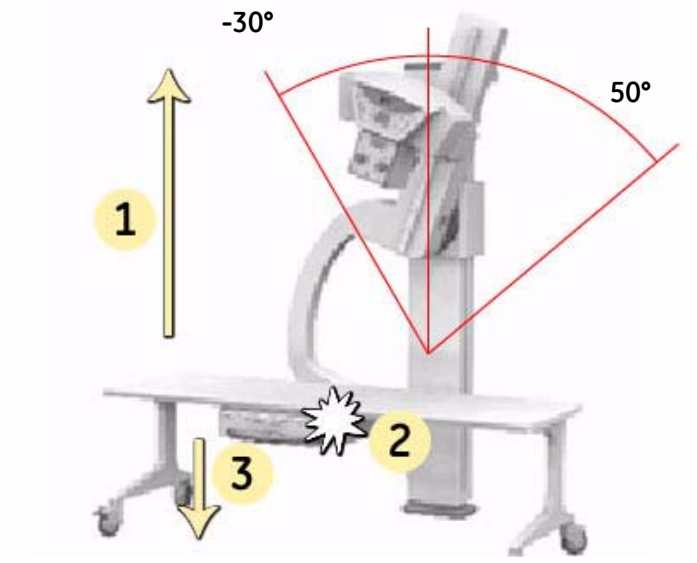
Figure 3-16 Anti-collision during vertical movement and rotation



1. Arm moves vertically or rotates.
2. Arm contacts an object.
3. Arm reverses movement.

- When the Arm is moving up, the anti-crushing will either reverse the movement or stop movement, depending on the following situations:
  - If the angle is between -30° and 50° (the angle range where the detector could be under the table), the system will reverse direction down (Figure 3-17).
  - If the angle is between 51° to 120° and in horizontal position, the system stops movement (Figure 3-18).

Figure 3-17 Anti-collision to prevent collision with table



1. Arm moves vertically when the image receptor assembly is below the radiographic table. (That is, at an angle between -30° and 50°.)
2. Arm contacts the table or an object.
3. Arm reverses movement.

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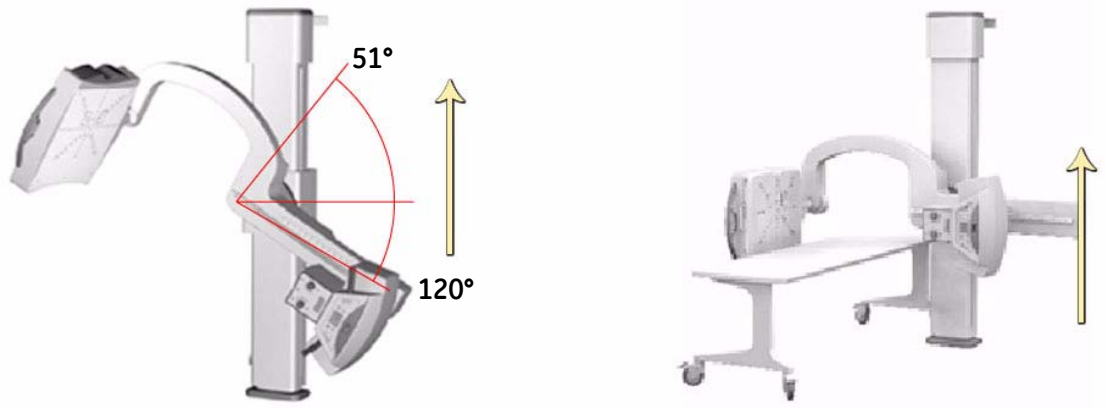
Figure 3-18 Vertical stop



NOTE: If the system does not resume movement after being stopped by the anti-crushing system, press and hold the Safety Lock button and then press the movement button required.

Interchangeable Grids

Assemblies with interchangeable grids are supplied with two grids and two slots (one for exposure and one for storage). Each slot includes a lever (Figure 3-19) to remove the grid from the slot. The storage slot is behind/underneath the receptor control handle.

Figure 3-19 Removing a grid from the exposure slot

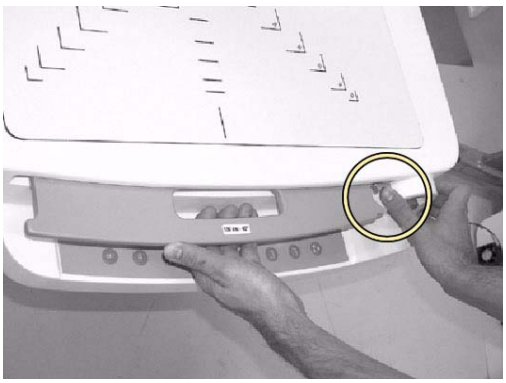


Table 3-6 lists the focal distance, ratio, line pairs, orientation, and range of each grid.

Table 3-6 Grids

Grid	Nominal Focal Distance	Ratio	Line Pairs	Grid Line Orientation	Range
1.	100cm (40in.)	13:1	70lines/cm	Vertical	90-115cm (35.43-45.28in.)
2.	180cm (72in.)	13:1	70lines/cm	Vertical	145-225cm (57.09-88.58in.)

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Automatic Collimator

The controls for the automatic collimator (Figure 3-20) are described in Table 3-7.

Figure 3-20 Collimator controls

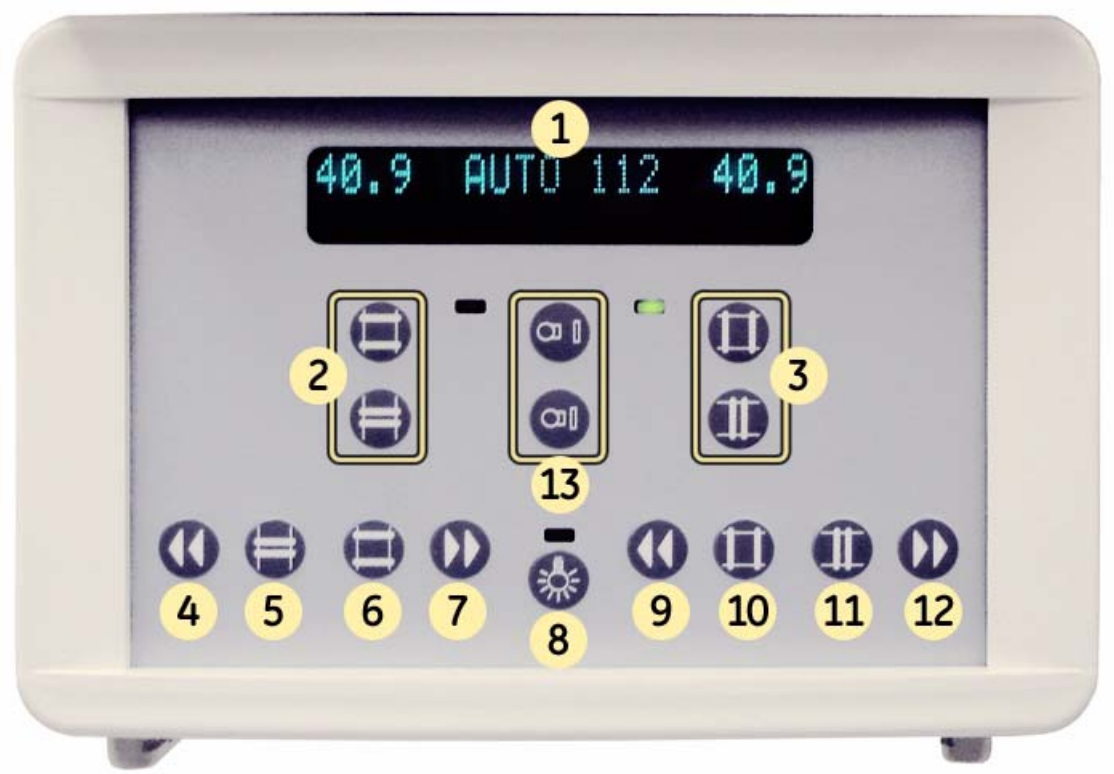

Table 3-7 Collimator controls description

Item	Description
1.	Collimator display: transverse field size, collimator mode, SID, longitudinal field size
2.	Transverse Field size Increase / Decrease These buttons are also included on the remote control (Figure 3-23). The remote control is an optional purchase.
3.	Longitudinal Field size Increase / Decrease These buttons are also included on the remote control (Figure 3-23). The remote control is an optional purchase.
4.	Fast Transverse Field size Decrease
5.	Slow Transverse Field size Decrease
6.	Slow Transverse Field size Increase
7.	Fast Transverse Field size Increase

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Item	Description
8.	Collimator Lamp Control (LED “ON”) This button is also included on the remote control (Figure 3-23). The remote control is an optional purchase.
9.	Fast Longitudinal Field size Increase
10.	Slow Longitudinal Field size Increase
11.	Slow Longitudinal Field size Decrease
12.	Fast Longitudinal Field size Decrease
13.	SID Change between 100cm and 180cm in over-ride mode.

Figure 3-21 Collimator Rotation

The collimator will rotate or swivel freely without lock or knob to release.

Figure 3-22 Collimator Key

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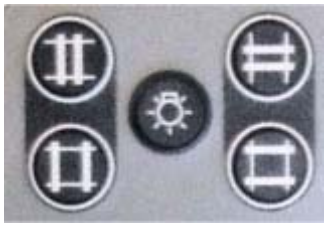
With the collimator key in the *vertical* position, the positive beam limitation mode is *enabled*. This is indicated by the text **Auto** on the collimator display.

With the collimator key in the *horizontal* position, the positive beam limitation mode is *disabled*. This is indicated by the text **Man** on the collimator display.

Figure 3-23 Collimator controls on remote

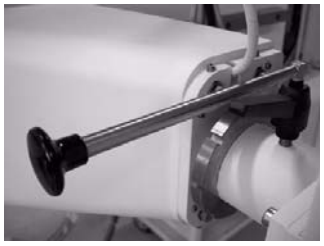


Tube-Collimator Assembly Positioning

Tube-Collimator Assembly is equipped with a blocking system (on top) ratchet. In order to change angle position of the Tube-Collimator Assembly in relation to its transverse axis, lift the ratchet. Ratchet has position detents every 45°.

WARNING: The ratchet must be at a pre-set detent.

Figure 3-24 Collimator lock lever



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Options and Accessories

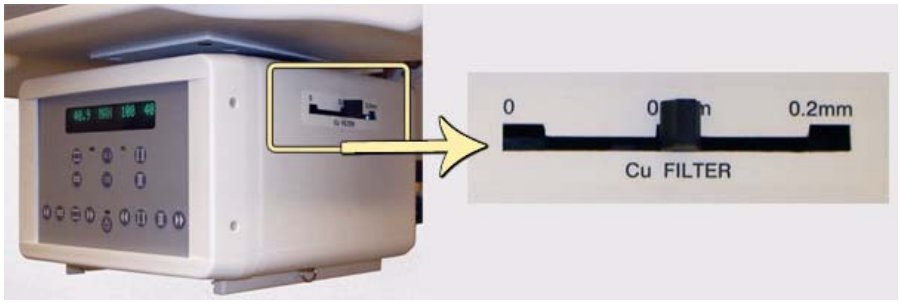
The following sections identify accessories for the Definium 5000 that may be purchased separately.

Copper Filtration

Copper filtration is a purchasable option. The switch for the copper filter is located on the right side of the collimator and allows a selection of 0.0mm, 0.1mm, or 0.2mm of copper filtration.

CAUTION: **If copper filtration is changed on the Acquisition screen, the operator must manually change the filtration selection on the collimator before making the exposure.**

Figure 3-25 Cu Filter switch on collimator - 0.1mm selected



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Radiographic Mobile Tables

There are three table options available for the Definium 5000:

- Non-elevating
- Non-elevating with carbon fiber table-top
- Elevating with carbon fiber table-top

Figure 3-26 Table options

Non-elevating laminated

Non-evelvating with carbon fiber table-top

Elevating with carbon fiber table-top

Table 3-8 Maximum load capacities for tables

Table	Capacity
Non-elevating laminated	200 kg / 441 lbs
Non-elevating carbon fiber	200 kg / 441 lbs
Elevating carbon fiber	225 kg / 495 lbs

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Grid and Accessories Holder

A holder to store grids is available for optional purchase. It is recommended that grids be stored in the holder when not in use. The holder is mounted on the wall and can store up to 4 grids.

Figure 3-27 Holder with grids

Weight-bearing Stand

A stand may be used to elevate a patient into position in front of the receptor.

WARNING: Always lock the wheels before allowing the patient on the stand.

Figure 3-28 Weight-bearing stand

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Image Pasting Patient Positioner

Image Pasting is a purchased option for the Definium 5000.The positioner is used to determine the correct Center of Interest (COI) and to accurately re-construct images.

Refer to Appendix A: Image Pasting for more information.

Figure 3-29 Image Pasting Patient Positioner

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Remote Control

The remote control (Figure 3-30) provides buttons for positioning commands and collimator adjustment. Refer to System Movement Controls (p. 3-8) and Automatic Collimator (p. 3-18) for more information.

Figure 3-30 Optional remote control

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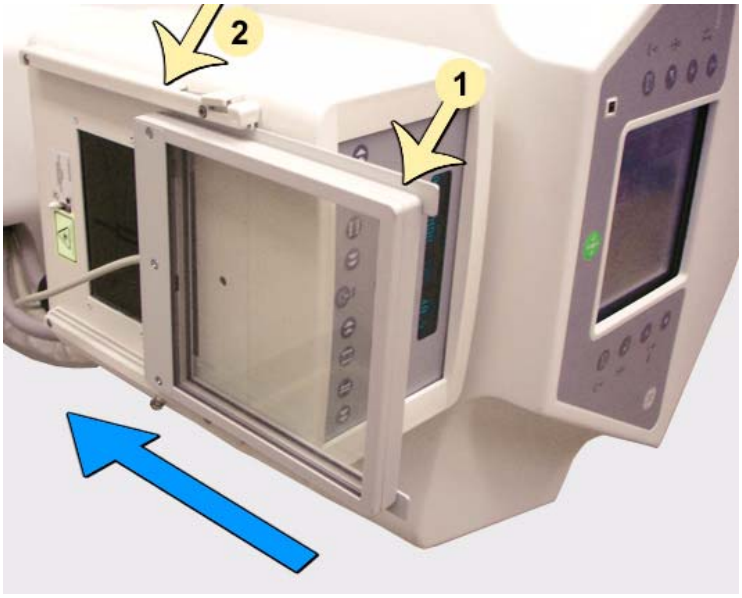
DAP Meter

A DAP meter is available for optional purchase. The DAP (Dose Area Product) meter estimates the entrance dose multiplied by the field-of-view area at the corresponding distance from receptor after an exposure is taken. The DAP is displayed on the Acquisition Screen. Refer to Chapter 6: Image Acquisition for more information.

Insert the DAP meter into the collimator rail with the cable towards the back of the system, as shown in Figure 3-31. Push the DAP meter back until it stops.

The DAP meter cable may be disconnected when the DAP meter needs to be removed for QAP or cleaning.

Figure 3-31 Optional DAP meter in collimator rail



1. DAP meter
2. Collimator rail

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Error Messages

Error messages indicate the potential cause of a system failure. They are shown on the touch screen panel or acquisition workstation. (Refer to Table 3-9.)

Table 3-9 Error Messages

Error Number	Description (in screen)	What To Do
1	Initialize EEPROM in Service Mode	Turn the unit Off and On. if error remains, call field service.
2	EEPROM could not be initialized	
3	Move without Order: Call Service	
4	Fatal RAM ERROR: Call Service	
5	Movement Order active during Start-up	Press the RESET ERROR button on the Touch Screen Console.
6	Security: Call Service	Turn the Unit OFF and call field service.
7	Initial Gauge Check: Restart	Turn the Unit OFF/ON, if error remains, call field service.
8	Communication Lost	
9	Inconsistent Relay Input	
10	Order without move	
11	Potentiometer	
12	Calibration	
13	External	
14	Potentiometer out of Range	
15	Movements locked	Press the Safety Lock button
16	Move Button Released	Operator stopped pressing the Auto positioning button. Press and hold until auto positioning has finished.
17	Incompatible Movements	A movement button has been pressed while auto positioning was in progress. Release the movement button.
18	Opposite Move	An opposite movement button has been pressed while other movement was in progress. Release the opposite movement button.

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Error Number	Description (in screen)	What To Do
19	Calibration Warning	Turn the Unit OFF/ON, if error remains, call field service.
20	Program not Selected	Move button has been pressed without having selected an auto-position.
21	Movement not enabled	Turn the Unit OFF/ON, if error remains, call field service.
22	Movement stop	Information message. The Unit has reached a position.
23	Collimator not communicating	Turn the Unit OFF/ON, if error remains, call field service.
24	Physical Limit: Height Maximum. Recalibrate	Lower tube height, if error remains, call service.

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Chapter 4: General Information

This chapter explains some of the basic operations and features of the system such as how to start up and shutdown the system software, how to login and log off, and how to view system status and messages.

Topics covered include:

- System Start Up and Shutdown (p. 4-2)
  - Start Up (p. 4-2)
  - Shutdown (p. 4-2)
- Login and Log off (p. 4-3)
  - Invalid Password Message (p. 4-4)
  - Emergency Login (p. 4-5)
  - Log Off (p. 4-5)
- Software Reset (p. 4-6)
- Lead Markers (p. 4-7)
- System Status and Messages (p. 4-7)
  - Expose Hold (p. 4-7)
  - X-ray Tube Heat Units Remaining (p. 4-8)
  - System Status Area (p. 4-8)
  - Message Log (p. 4-8)
- iLinq (p. 4-9)

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System Start Up and Shutdown

This section describes the procedure for starting up and shutting down the Definium 5000 system.

Start Up

1. Press the ON button located at the CRIB Console (Figure 4-1).
2. Wait for the system software to boot up and the login screen to appear.

NOTE: The unit may take 3 minutes for the system to start and software to boot up. You cannot take acquisitions until the software is fully booted.

Figure 4-1 Power ON/OFF buttons on CRIB

1. Emergency Stop button
2. Power OFF button
3. Power ON button

WARNING: **In the event of an emergency, press the "Emergency Stop" button on the system cabinet, the receptor, or the CRIB with force.**

Refer to Chapter 3: System Overview-Control Room Interface Box (CRIB) (p. 3-5) for more information about the CRIB and its functions.

Shutdown

Option 1 for Shutdown:

1. Close all current exams.
2. Press and hold the Power OFF button on the CRIB (Figure 4-1) for 5 seconds.
   - A message will appear: "System shutdown in progress; may take 2 minutes."
3. The screen will close and the system will then shutdown.

Option 2 for Shutdown:

1. Close all current exams.
2. Press the [UTILITY] button at the top of the Worklist screen.

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Figure 4-2 Utility button

3. Select the [SHUT DOWN] button.
   - A message will appear: "The system will be shut down."
4. Press [YES] to proceed with the shut down; you will hear a beep as the system shuts down.
   - If you press [CANCEL] the system will not shutdown and it will return you to the Utilities screen.

NOTE: Refer to Software Reset (p. 4-6) for information about the Software Reset function.

NOTE: You must wait 15 seconds after power is removed from the system before powering the system back up.

Login and Log off

This following sections apply if the system is configured for Login ability in the Service User Interface.

Refer to Appendix B: Login Administration for information on administering the login function.

Standard Login

The Login screen (Figure 4-3) appears when the system is started, reset, and after a user logs off. The system may also be configured to display the Login screen if the system has been inactive for a specified period of time (inactivity timeout).

Figure 4-3 Example login screen.

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Follow this process to login to the system.

1. Start up the system or log off the previous user.
   - The Login screen appears.
2. Enter your **Login Name**, if necessary.
3. Type in your **Password**.
4. Press [LOGIN].
   - The Worklist appears.

NOTE: If you have administrator access, a message appears: "You have both regular user and admin user privileges. To access the admin screen, select the check box before continuing with the login, otherwise just continue with the login."

- To login and begin working with the unit, press [LOGON] and the Worklist appears.
- To login and access login administrator functions, select the **Enter admin screen** checkbox and then press [LOGON]. The Login Administration screen appears. Refer to Appendix B: Log-in Administration for more information.

Invalid Password Message

Your Password must be entered correctly for you to log in. If the password you entered is not the correct password for the entered Login Name, an error message will appear.

1. Make sure that the correct **Login Name** is displayed in the field. Depending on the configuration, the Login Name may be case sensitive. That is, "aBc" is not the same Login Name as "Abc."
2. Retype your **Password** carefully. Your password is case sensitive; that is, "xYz" is not the same password as "Xyz."
3. Press [LOGON].
   - Contact your technical support group or system administrator if you still are not able to login.

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Emergency Login

Emergency Login is a HIPAA required function to allow quick access to medical systems in the event of an emergency. Depending on the system's configuration, this option may not be available. Refer to Appendix B: Login Administration to configure the Emergency Login function.

Emergency Login will allow exposures, but does not allow connection to HIS/RIS or PACS hosts.

CAUTION: The Emergency Login function should NOT be used when there is time to login normally, when there is time to receive assistance from technical support, or if there is no emergency situation. Your facility may track the use of this function.

1. Press [EMERGENCY LOGON].
   - Depending on the system's configuration, you may be prompted to enter your name. Enter your name and press [LOGIN].
2. The Worklist screen appears.

Log Off

1. Close, suspend, or discontinue any open exams, if necessary.
2. Close the Image Viewer, if necessary.
3. Press [LOGOFF] at the top of the Worklist or Image Management screen.
   - Or open the Utility screen, go to **System** and press [LOGOFF] (Figure 4-4).

Figure 4-4 Utilities screen logoff button

   - A message appears: "Do you really want to log off?"
4. Press [OK].
   - The Login screen appears.
   - [CANCEL] closes the screen and returns you to the last screen.

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Software Reset

Software reset is used to restore the system software. A software reset may take1-2 minutes to complete.

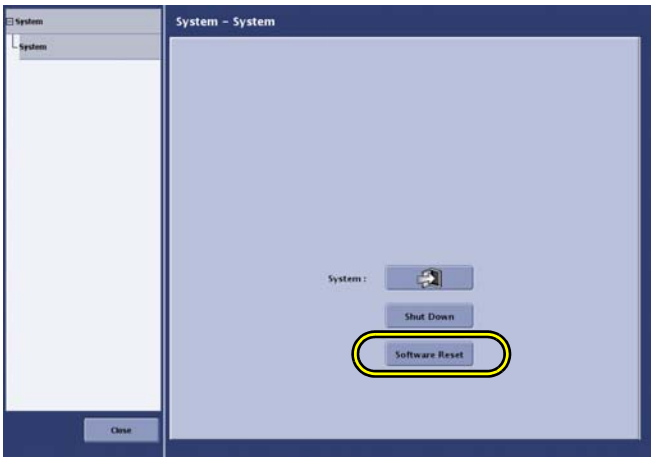
NOTE: Software reset **does not** require Shutdown.

NOTE: The system will not be available for acquiring images during the reset cycle.

Follow this process to perform a software reset.

1. Close all open exams.
2. On the Worklist or Image Management screen, press [UTILITIES].
   - The System – System screen (Figure 4-5) appears.

Figure 4-5 System – System screen with Software Reset button



3. Press [SOFTWARE RESET].
   - A message appears: "Press OK to restart Software Application. Press Cancel to return."
4. Press [OK].
   - A "Loading Application" progress bar appears on screen.
   - The login screen appears once the software has been reset.
5. Login to the system to begin work.

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Lead Markers

As in any General Radiography procedure, lead marker placement is important to ensure markers are properly recorded on the image. Place the lead marker in an area of patient attenuation. If lead markers are placed in regions of direct radiation (saturation), there is a high risk they will be processed out of the image during image processing. Saturated areas beyond the anatomy are no longer part of the final image. This is most likely to happen on high technique exposures.

CAUTION: Exercise care when placing lead markers to guarantee their presence in the final image. Every attempt must be made to assure markers are not located in regions of direct radiation, but are located in regions where some patient attenuation of radiation is present without obstructing the anatomical information of interest.

System Status and Messages

Several types of messages and indicators are displayed on the Acquisition Workstation screens to inform you of the system and subsystem operational status as well as error messages. The complete list of error messages is available in the Service Manual.

Expose Hold

The Expose Hold button (Figure 4-6) appears at the bottom of the Worklist or Acquisition screens when there is some condition that prevents an x-ray from being taken, such as no exam is open or the protocol is not selected.

Press the Expose Hold button to view a list of all errors and interlocks that are preventing the exposure (Figure 4-6). The items are removed from the list as they are corrected. The Expose Hold button disappears when all errors and interlocks are corrected.

Figure 4-6 Worklist and Acquisition screen Expose Hold button

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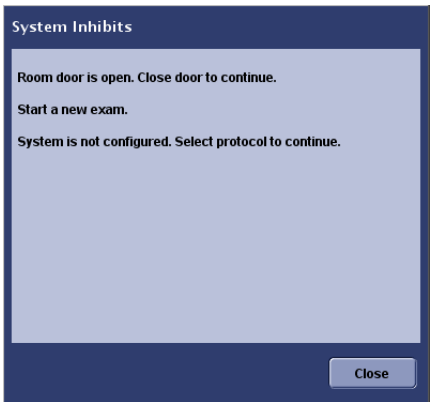
Figure 4-7 Example system Inhibits list


System Inhibits
Room door is open. Close door to continue.
Start a new exam.
System is not configured. Select protocol to continue.
Close

X-ray Tube Heat Units Remaining

The Heat Units Remaining area (Figure 4-8) on the bottom of the Worklist and Acquisition screens shows the available capacity for the tube to absorb heat before it must be allowed to cool. A high percentage indicates that the tube is relatively cool and is able to take multiple exposures.

If the tube becomes too warm (20% heat units or less), exposures will be inhibited until the tube cools to a functional level.

Figure 4-8 Heat Units Remaining status

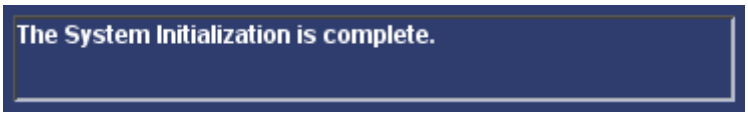
System Status Area

System status messages are displayed on the bottom of all main Workstation screens (Figure 4-9). System Status messages are displayed when the system detects an irregularity in system operation. The message informs you when remedial action is required to correct the situation.

A console beep announces the arrival of an informational message. There are situations where a system condition is detected that does not require stopping the procedure. The message tells you to Continue or to Continue/Call Service (continue and call service).

NOTE: To clear the system status area, open the Message Log (described below) and close it again.

Figure 4-9 Example of a System Status message



Message Log

Pressing the Message Log button at the bottom of any screen opens the Message Log (Figure 4-10). The Message Log shows all status messages since the last system restart. The messages are listed in descending chronological order, that is, the latest message is listed first. This screen allows operators and service personnel to display, review, and analyze system status messages.

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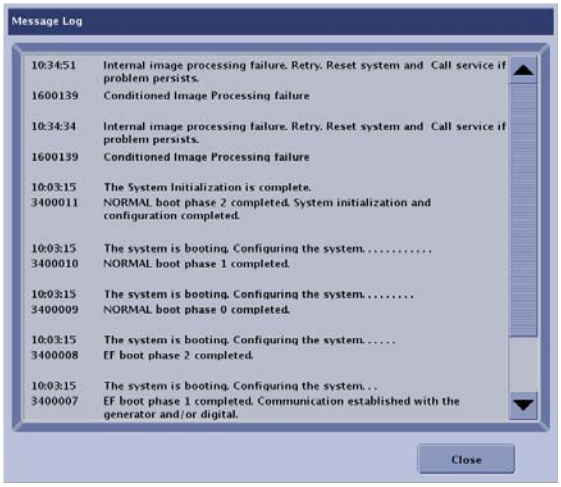
Figure 4-10 Message Log


Message Log
10:34:51 Internal image processing failure. Retry. Reset system and Call service if problem persists.
1600139 Conditioned Image Processing failure
10:34:34 Internal image processing failure. Retry. Reset system and Call service if problem persists.
1600139 Conditioned Image Processing failure
10:03:15 The System Initialization is complete.
3400011 NORMAL boot phase 2 completed. System initialization and configuration completed.
10:03:15 The system is booting. Configuring the system. . . . . .
3400010 NORMAL boot phase 1 completed.
10:03:15 The system is booting. Configuring the system. . . . . .
3400009 NORMAL boot phase 0 completed.
10:03:15 The system is booting. Configuring the system. . . . .
3400008 EF boot phase 2 completed.
10:03:15 The system is booting. Configuring the system. . .
3400007 EF boot phase 1 completed. Communication established with the generator and/or digital.
Close

iLinq

iLinq is an optional feature of your system that allows access to remote service and clinical applications support.

The iLinq system lets authorized Service Engineers and Applications Specialists, located at GE Healthcare' Service Support Centers, access X-ray systems (with your permission) to provide the following services:

- Faster Emergency Service response
- Customer Applications training and assistance
- System troubleshooting and diagnostics
- Accumulate system information for failure analysis, resolution and prediction to assist in maintaining optimal X-ray system performance

Figure 4-11 iLinq Main Screen

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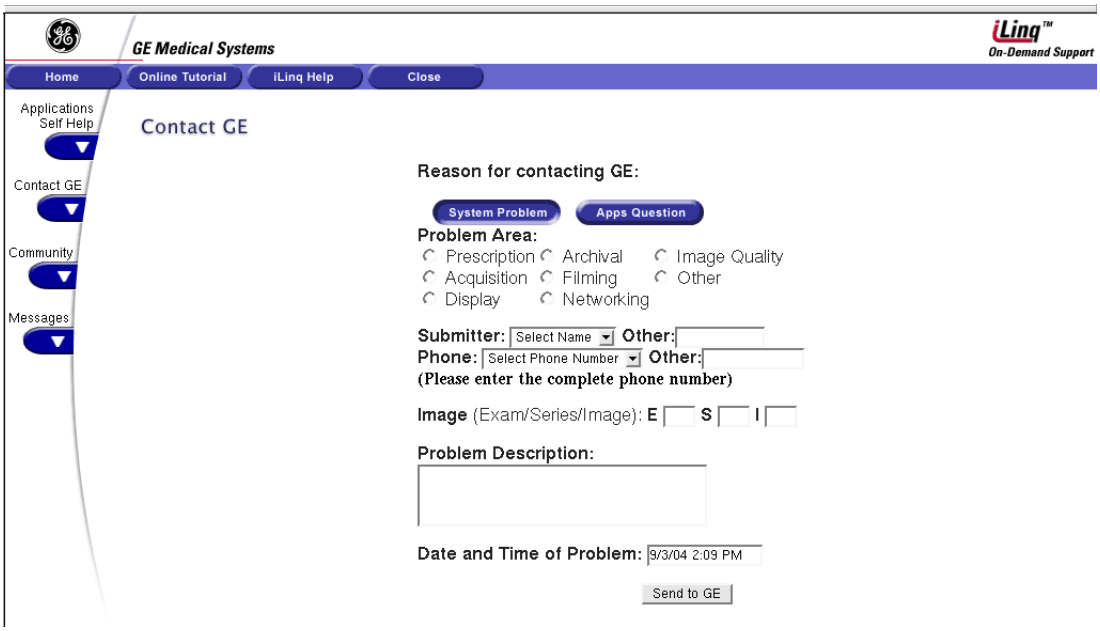
Table 4-1 iLinq Screen functions

Function	Description
Applications Self Help	Provides applications protocol descriptions, newsletters, and a list of frequently asked questions as well as additional TiP (Training in Partnership) educational opportunities
Contact GE	Allows the electronic submission of a service request or applications question directly to the Online Center. Figure 4-12 shows the screen you use to report a problem with your system, using the iLinq system.
Community	Connects you to GE Healthcare' online community of experts.
Messages	Receives messages from the Online Center.
Online Tutorial	Access online training for iLinq features.
ILinq Help	Provides help for all of the iLinq features. In order to receive detailed help on a particular topic, simply make your selection from the items to the left side of the screen by clicking on them.
Close	Closes iLinq and returns you the GE Digital Detector system user interface.

Figure 4-12 iLinq Contact GE screen



Use this procedure to connect to the iLinq system when you need to report a problem with your system.

1. Click the [iLinq] icon on the Worklist or Acquisition screens.
2. Click [CONTACT GE].
3. Enter the required information into the Contact GE iLinq screen.

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4. Click [SEND TO GE].
5. Click [CLOSE].
   - iLinq closes and returns you to the Worklist or Acquisition screens.

Installation and use of the iLinq system is limited to GE Customers with an X-ray system that is under warranty or covered by a valid GE Service Contract, in accordance with the terms and conditions of the iLinq Agreement or GE Service Contract. The presence of the GE iLinq system alone, at a your site, does not provide you any rights or title to the iLinq system or any license or right to access, use or decompile the iLinq system. Any access to or use of the iLinq system beyond the conditions specified in the iLinq Agreement or GE Service Contract; or any decompilation of the iLinq system by anyone other than GE personnel is prohibited. By signing the iLinq Agreement, you agree to use reasonable effort to protect the iLinq system against damage or loss and to prevent access to, use of or decompilation of the iLinq system by unauthorized personnel.

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Chapter 5: Worklist

The Worklist is the starting point for patient set up and selecting procedures for acquisition. All exams begin from this screen.

The Worklist information and functions are based on DICOM standards.

This chapter explains the procedures for entering data into the system and setting up a patient.

Topics covered include:

- Overview (p. 5-1)
  - Patient List Columns (p. 5-6)
- Manage List / Find Procedures (p. 5-7)
  - Search (p. 5-7)
  - Sort by Column (p. 5-7)
  - Filter List (p. 5-8)
  - Refresh (p. 5-11)
- Select Procedures (p. 5-12)
- Delete Procedures (p. 5-12)
- Add / Edit Patient Information (p. 5-15)
  - Overview (p. 5-15)
  - Add Patient (p. 5-18)
  - Edit Patient Information (p. 5-19)

Overview

The Worklist (Figure 5-1) shows scheduled, completed, discontinued, suspended, and active procedures.

The majority of the Worklist is the Patient List. The Patient List is a large table made of columns and rows. Each row in the list is a procedure, or exam, to be performed. A patient may have multiple procedures (rows) on the Worklist.

Procedures listed can be classified under two categories:

- Locally entered procedures: This category refers to procedures entered directly on the system workstation by manually entering the information. Locally entered procedures are only available to the unit or workstation that they were entered on. They do not update automatically and no other units or workstations can access them.
- Hospital Information System (HIS) or Radiology Information System (RIS) Procedures: This category refers to procedures that the Worklist can automatically update from the central HIS/RIS database. Other units or workstations can be configured to access these procedures.

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Figure 5-1 Worklist screen

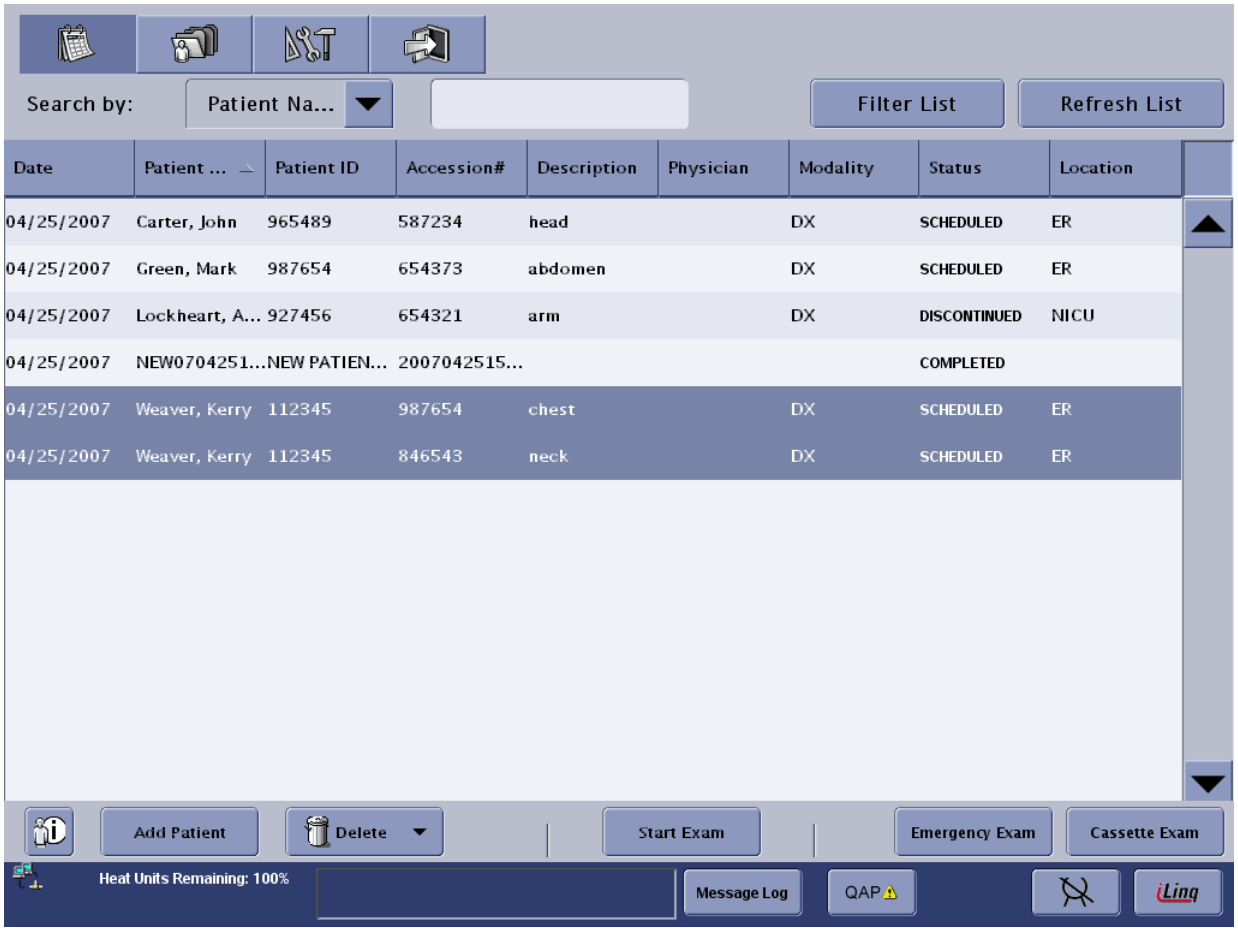

Table 5-1 lists and describes all the functions on the Worklist screen.

Table 5-1 Worklist Functions

Function	Description
navigation bar	Allows you to change between the Worklist, Image Management, and Utilities screens or allows you to logoff the system (if applicable). The darker color indicates which screen is currently displayed. The individual buttons are described below.
[WORKLIST]	Opens the Worklist screen where patient procedures may be added to the schedule and exams started.

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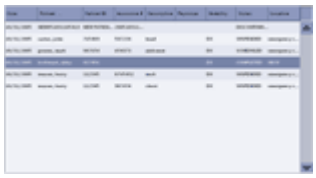
Function	Description
[IMAGE MANAGEMENT]	Opens the Image Management screen where images may be selected for viewing or be copied to other exams. Refer to Chapter 9: Image Management for more information.
[UTILITIES]	Opens a screen where system settings (such as Network and Printer connections) and preferences may be changed. If the Login function is enabled, the preferences you are allowed to change will vary depending on your level of access. Refer to Chapter 10: Set Preferences for more information.
[LOG OFF]	If the Login function is enabled, pressing this button logs the current user off of the system. Refer to Chapter 4: General Information-Login and Log off (p. 4-3) for more information.
Search	Searches for procedures by the selected column name in the drop-down list and the search criteria entered into the text box. Refer to Search (p. 5-7) for more information.
[REFRESH LIST]	Updates the Worklist view with new information from the HIS or RIS, which shows changes to the procedure records. Also removes any filters that have been applied. Refer to Refresh (p. 5-11) for more information on automatically refreshing the Worklist.
[FILTER LIST]	Displays a Worklist query screen and filters the RIS or HIS records to find procedures that meet specific criteria. Refer to Filter List (p. 5-8) for information on how to filter the Worklist.
Patient List Area 	Shows all procedures scheduled for examinations during a working day. Procedures on the list may be downloaded from the RIS/HIS or may be created locally. The list may be sorted by column, searched, or filtered. Refer to Manage List / Find Procedures (p. 5-7) for more information. The time period displayed is configurable. Refer to Chapter 10: Set Preferences-Worklist (p. 10-13) for information on changing the time period displayed.

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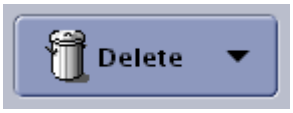
Function	Description
[PATIENT INFORMATION] 	Shows the Patient Information screen for the selected procedure. **NOTE:** Patient Information is editable if the currently selected procedure has not been opened. Once the exam starts the Patient Information is no longer editable. Patient Information is not editable if multiple procedures are selected. Refer to Add / Edit Patient Information (p. 5-15) for more information.
[ADD PATIENT] 	Allows you to enter patient information and adds the patient to the Patient List. Refer to Add / Edit Patient Information (p. 5-15) for more information.
[DELETE] or [DELETE ALL] 	Switches between [DELETE] and [DELETE ALL] to remove procedures from the Worklist. [DELETE] - Removes the selected procedure or procedures from the Patient List. [DELETE ALL] - Removes all completed and discontinued procedures from the Patient List. **NOTE:** [DELETE] or [DELETE ALL] does not remove procedures from the RIS or HIS or remove any exam images from the image database. Refer to Delete Procedures (p. 5-12) for more information.
[START EXAM] or [RESUME EXAM] 	Starts, continues, or appends the selected procedure. The button name changes depending on the Scheduled Status of the selected procedure. If the selected procedure has a Status of "Suspended", the button name changes to [RESUME EXAM].
[EMERGENCY EXAM] 	Begins an exam without selecting a procedure from the Patient List or adding the patient. The system will assign a unique tracking number as the Patient Name. Refer to Chapter 6: Image Acquisition-Conduct an Emergency Exam (p. 6-16) for more information. The tracking number is the date and time the exam was initiated. The time is recorded to the second.

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Function	Description
[CASSETTE EXAM] 	Begins a cassette exam. Cassette exams allow exposures to be taken without any digital patient record or image storage. Refer to Chapter 6: Image Acquisition-Conduct a Cassette Exam (p. 6-14) for more information.
network connection status 	Appears when the Definium 5000 is connected to the hospital network.
Heat Units Remaining 	Shows the percentage of heat units remaining. Refer to Chapter 4: General Information-X-ray Tube Heat Units Remaining (p. 4-8) for more information.
system status 	Displays the last system status message. To clear the system status area, open the Message Log and close it again. Refer to Chapter 4: General Information-System Status and Messages (p. 4-7) for more information.
[MESSAGE LOG] 	Brings up the message log since the last system re-start. Refer to Chapter 4: General Information-System Status and Messages (p. 4-7) for more information.
[QAP] 	Brings up the screens that allow you to perform QAP. Refer to Chapter 11: Quality Assurance Process and Maintenance for more information.
[EXPOSE HOLD] 	Appears when there is some condition that prevents an x-ray from being taken. Press the button to view a list of all errors and interlocks that are preventing the exposure. The items are removed from the list as they are corrected. The button disappears when all errors and interlocks are corrected.
[iLinq] 	Connects to iLinq remote support services. Refer to Chapter 4: General Information-iLinq (p. 4-9) for more information.

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Patient List Columns

Table 5-2 describes the columns on the Worklist. This information comes from what has been entered in the Patient Information screen. Refer to Overview (p. 5-15) for detailed descriptions of the information presented.

Table 5-2 Worklist columns

Column	Description
Date	The date the procedure is scheduled to occur. On locally added procedures, the current date is the default.
Patient	The full name of the patient as entered in Add Patient/Patient Information screen.
Patient ID	The patient's medical record number or any number that distinguishes the patient.
Accession #	The exam's accession number.
Description	The procedure ordered for the accession number. (This is the content of the Procedure Description field on the Add Information screen.)
Physician	The name of the physician or technician who performed the exam. (This is the content of the Performing Physician field on the Add Information screen.)
Modality	The modality of the procedure.
Status	The status of the procedure. Available options are: • Scheduled – procedure has been created but not started. • Completed – procedure has been closed. • Suspended – procedure was started then interrupted. • Discontinued – procedure was opened but cannot be completed. Refer to Chapter 6: Image Acquisition-End Exam (p. 6-16) for more information about Completed, Suspended, and Discontinued exams.
Location	The location of the patient within the facility.

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Manage List / Find Procedures

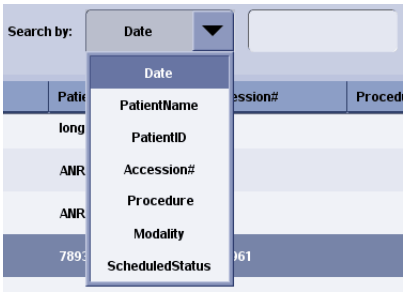
The Worklist has several features that allow you to find patients and procedures quickly and to organize the list to your preferences.

Search, Filters, and Sorting allow you to control the display of the procedures in the Worklist.

Search

The Search feature finds procedures by column.

Figure 5-2 Search by column drop-down list



1. Press the button on the Search By drop-down list to select the column you want to search.
   - If the column you want is already selected, begin at step 3.
2. Select the column. For example, Patient Name.
   - The list is sorted by the selected column in alphabetical or numerical order.
3. Type the search criteria into the text box.
   - The list automatically goes to the first procedure that matches the entered criteria.
   - If the list is long enough, it will scroll to the first item so that it appears at the top of the list.

NOTE: The text box is not case sensitive. That is, it does not matter if you used upper or lower case.

- If no procedures match what you have typed, the list de-selects all procedures and places the closest match at the top of the Worklist.

Sort by Column

Sorting allows you to organize the procedures by the column of your choice.

1. Press the column heading you want to sort, or choose the column in the Search By drop-down list. For example, if you want to see all the procedures that have a status of “Suspended”, press the “Status” column heading.
   - An arrow appears in the column heading to indicate which column is currently being sorted.

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2. Press the column heading again to switch between ascending and descending order.
   - An up-pointing arrow indicates that the column is sorted in ascending order. That is, sorted in alphabetical order or numerical order from smallest to largest.
   - A down-pointing arrow indicates that the column is sorted in descending order. That is, sorted in reverse alphabetical order or numerical order from largest to smallest.

Figure 5-3 Column with ascending sort

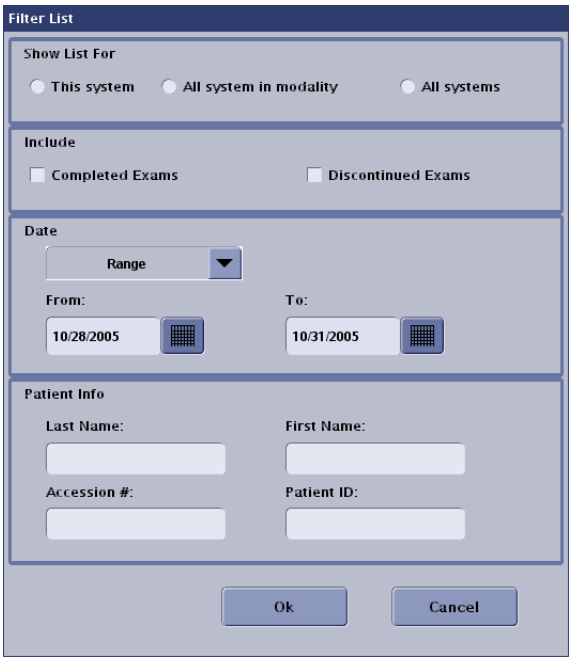
Filter List

Use filters to only display items corresponding to your chosen criteria, e.g., exams taken only within a specified time period, patients whose last names begin with the letter 'J', or patient IDs beginning with the digits '547'.

Filters cannot be saved.

Pressing [REFRESH] will remove any filter that has been applied.

Figure 5-4 Worklist filter screen



The filter screen has several options for accepting or rejecting the information from the Worklist. Table 5-3 describes the filter screen functions.

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Table 5-3 Filter Acceptance/Rejection Buttons

Function	Description
Show list for	Filters the Worklist items by system or modality. • This system – procedures entered locally on the unit • All systems in modality – procedures for all digital x-ray • All systems – procedures for all modalities
Include	Allows you to include or exclude completed or cancelled (discontinued) exams in the filter.
Date	Allows you to select the date of exams to filter by. • All – procedures scheduled for any date • Range - procedures scheduled for a specified range of time • Today – procedures scheduled for the current date
From (mm/dd/yyyy) To (mm/dd/yyyy)	When the "Range" option is selected for the date, allows you to enter dates or pick dates from a calendar screen.
Patient Information	Allows you to filter based on data from the Patient Information screen. Available options are: • Last Name • First Name • Accession # • Patient ID The filter may be restricted by any or all of these fields. Leaving a field blank means that it will not be included in the filter.
[OK]	Applies the filter and returns you to the results on the Worklist.
[CANCEL]	Clears the Filter screen and returns you to the Worklist.

Follow this process to filter the Worklist.

NOTE: The fields may be completed in any order.

1. Press [FILTER LIST] on the Worklist screen.
   - The Filter Screen appears
2. Select the **Show list for** option.
3. Select the **Include** options.
4. Select the **Date** option.

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5. If you selected **Range** for the Date option, enter or select the **From** and **To** dates.
   - The current date appears in both the **From** and **To** fields by default.
   - To select dates from the calendar:

   a) Press the [CALENDAR] button.

Figure 5-5 Calendar button

   – The Filter calendar screen appears with the current date selected.

Figure 5-6 Filter calendar screen

   b) Press [◂] to select the previous month, if necessary.

   c) Press [▸] to select the next month, if necessary.

   d) Press a date to select it.
      – The calendar closes automatically when a date is clicked.

6. Enter any **Patient Information** you want to filter by.
   - You do not need to enter full words or numbers into these text boxes.
   - Entering more information into these text boxes will reduce the number of results.
   - Entering less or no information into these text boxes will increase the number of results.

NOTE: The Patient Information text boxes **are** case sensitive.

7. Press [OK].
   - The Filter screen closes and the Worklist screen appears with only those procedures that met all of the filtering criteria.
   - If no procedures met all the criteria, the Worklist will be blank.

8. Press [REFRESH] to remove the filter.

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Refresh

The Definium 5000 system may be configured to automatically refresh the Worklist with data from the HIS/RIS on a regular basis (such as every 10 minutes). However, if your system does not automatically refresh—or you want to refresh the list before the scheduled time—you are able to refresh the list manually.

The Refresh feature also removes any filtering that has been applied. Refer to Filter List (p. 5-8) for more information.

Manual Refresh

Follow this process to manually refresh the Worklist.

1. Press [REFRESH] on the Worklist.
   - The Worklist updates with HIS/RIS data and removes any filtering.

NOTE: Refresh does not remove locally added procedures.

NOTE: You will not be able to make selections or access Worklist functions while the Worklist is refreshing.

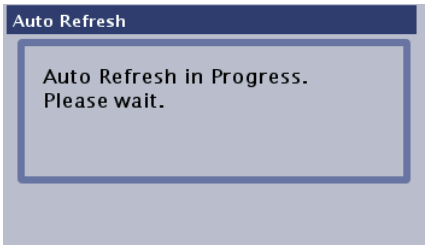
Auto Refresh

The Auto Refresh interval is set on the Preferences – Worklist screen in System Utilities. Refer to Chapter 10: Set Preferences-Worklist (p. 10-13) for more information.

When the system auto refreshes, a message (Figure 5-7) appears: "Auto Refresh in progress. Please wait." The message remains until the refresh process is complete.

NOTE: You will not be able to make selections or access Worklist functions while the Worklist is refreshing.

Figure 5-7 Auto refresh message



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Select Procedures

Use the following processes to select a patient from the Worklist. This process assumes the patient already exists on the system. If the patient is not on the Worklist, you must add the patient first. Refer to Overview (p. 5-15) for more information.

Select a Single Procedure

1. Close or suspend any open exams, if necessary. Refer to Chapter 6: Image Acquisition-End Exam (p. 6-16) for more information.
   - The Worklist screen appears.
2. Select the procedure from the Worklist.
3. Refer to Chapter 6: Image Acquisition to conduct the exam.

Select Multiple Procedures

You may select multiple procedures for the same patient to begin image acquisition.

NOTE: The Patient Name, Patient ID #, and Exam Date must match exactly in order to be selected.

1. Sort the Worklist by Patient Name, if necessary.
2. Press procedure.
3. Press another procedure for the same patient.
4. Continue pressing procedures until all procedures for the patient are selected.
5. Press any other procedure to deselect the procedures.

Delete Procedures

You may remove procedures from the Worklist individually or all completed, discontinued, and locally added procedures at once.

The [DELETE] button is able to switch between individual delete or delete all.

NOTE: Deleted procedures cannot be recovered or “undeleted.”

To switch the button between “Delete” and “Delete All”:

1. Press on the small arrow on the right side of the button.
   - A list appears with the available actions.

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Figure 5-8 Delete button options

2. Press the action you want to perform.
   - The system performs the action and the button name changes to the selection you made. The button will perform the selected action each time it is pressed until you change it.

NOTE: [DELETE] or [DELETE ALL] does not remove procedures from the RIS or HIS. [DELETE] or [DELETE ALL] does not remove any exam images from the image database.

Delete a Single Procedure

1. Select the procedure to delete.
2. Press [DELETE]. If necessary, switch the button to [DELETE].
   - A message appears: "Are you sure that you would like to delete the selected items?"
3. Press [OK] to delete the procedures.
   - [CANCEL] retains the procedures and the Worklist appears.

Delete All Completed, Discontinued, and Local Procedures

1. Press [DELETE ALL]. If necessary, switch the button to [DELETE ALL].
   - A message appears: "All Completed, Discontinued, and locally scheduled exams will be deleted from this list. Any suspended exams will need to be individually deleted."
2. Press [OK] to delete the procedures.
   - The selected procedures are deleted and the Worklist appears.
   - [CANCEL] closes the message, retains the procedures, and takes you back to the Worklist.

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Delete Suspended Procedures

Suspended procedures cannot be deleted unless their status is changed to “Completed” or “Discontinued”

1. Select the suspended procedure to delete.
   - A message appears: “The patient entry you are trying to delete is still in progress. Would you like to mark the patient as ‘Completed’ / ‘Discontinued’ and proceed with deletion?”
2. Press [COMPLETE] or [DISCONTINUE].
   - [COMPLETE] changes the Status to of the procedures to “Completed.” If enabled, any acquired images are auto pushed, auto printed, and sent to PACS.
   - [DISCONTINUE] changes the Status to “Discontinued.” Any acquired images are marked as Discontinued and the information is sent to PACS.
   - [CANCEL] closes the message and returns you to the Worklist without deleting procedures.
   - The procedures are removed from the Worklist.

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Add / Edit Patient Information

Overview

The Add Patient (Figure 5-9) and Patient Information screens allow you to enter patient and procedure information before starting an exam or to view the information at any time.

NOTE: This screen may also be known as the Medical Procedure Card or MPC.

- To add a patient to the Worklist, press [ADD PATIENT] and enter or select the appropriate information.

NOTE: Make sure the patient's name, ID number, birth date, and gender information are entered correctly.

CAUTION: Use only standard alphanumeric characters to complete the screen.

- To view the patient information from the Worklist or Image Management screens, select the exam then press [PATIENT INFORMATION]. Patient information is not editable when launched from the Image Management screen.
- To view the patient information from the Acquisition or Image Viewer screens, press [PATIENT INFORMATION]. Patient information is not editable when launched from these screens.

Patient Information provided by the HIS/RIS is not editable.

Patient Information entered locally is editable until the exam is started. It is not editable after the exam is started or in progress.

NOTE: The Patient Information button is unavailable when multiple exams are selected at the same time.

Figure 5-9 Add Patient or Patient Information

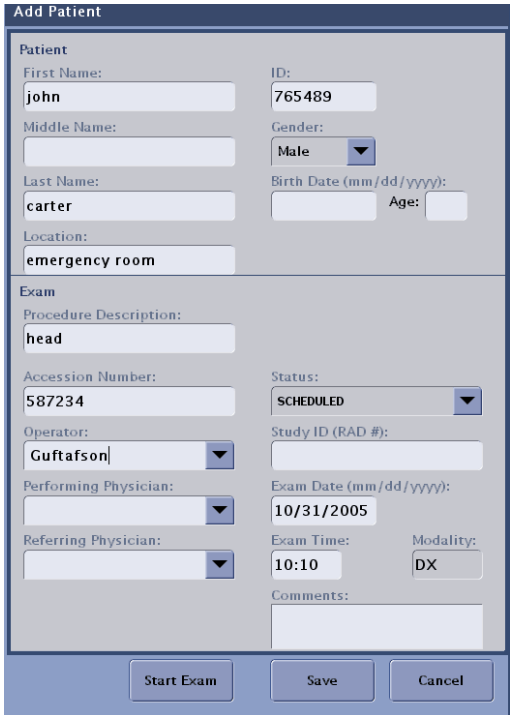

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Table 5-4 Patient Information description

Function	Description
Patient Section	
First Name	Identifies the patient's first name.
Middle Name	Identifies the patient's middle name or initials.
Last Name	Identifies the patient's last name. **NOTE:** Emergency Exams automatically fill this field with a system-generated identification, which is the word "NEW" followed by a date and time stamp of the second the Emergency Exam button was pressed. For example: NEW050622140345. The exam was initiated in year 05, month 06, day 22, hour 14, minute 03, and second 45.
Location	Identifies the patient's location. The HIS or RIS usually completes this field.
ID	Identifies the patient's medical record number or any number that distinguishes the patient. This number must be unique.
Gender	Defines the sex of the patient. By default, "Other" is selected when the screen first opens.
Birth Date	Identifies the patient's birthday in the format dd/mm/yyyy. If the date is not entered in the correct format, the screen will show the date field in red when [START EXAM] or [SAVE] is pressed. In the above example, the year was entered with only 2 digits ("45" instead of "1945").
Age	Identifies the patient's age. The field updates with the correct age when the Birth Date is entered.
Exam Section	
Procedure Description	Describes the procedure or series to be performed.
Accession Number	Identifies the exam's accession number.
Operator	Identifies the operator's name or initials. You can use the drop-down list to select commonly used names, or type the name into the drop-down list box. Refer to Chapter 10: Set Preferences-Preset Names (p. 10-15) for information on adding names to the drop-down list.

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Function	Description
Performing Physician	Identifies the Radiologist or performing physician. You can use the drop-down list to select commonly used names, or type the name into the drop-down list box. Refer to Chapter 10: Set Preferences-Preset Names (p. 10-15) for information on adding names to the drop-down list.
Referring Physician	Identifies the referring physician. You can use the drop-down list to select commonly used names, or type the name into the drop-down list box. Refer to Chapter 10: Set Preferences-Preset Names (p. 10-15) for information on adding names to the drop-down list.
Status	Displays the status of the selected exam. When adding a patient, the only option is “Scheduled”. Patient Information options are: • Scheduled - The procedure has been added to the Worklist, but the exam has not started. • Suspended - An exam was started but interrupted before completion. The exam may be resumed at a later time. • Complete - The exam is one that has been “Closed” on the Acquisition screen or marked as “Complete” on the Patient Information screen. Completed exams are sent to the PACS (where available). • Discontinued - The procedure was opened, but no exposures were taken. The exam may be started at a later time or the procedure deleted. • In progress - The exam is currently in progress.
Study ID (RAD #)	Displays the procedure ID number.
Exam Date	Sets the scheduled date of the selected exam. By default, the current date is automatically inserted. You may change this date as necessary.
Exam Time	Sets the time for the patient’s exam to be performed. By default, the time when the [ADD PATIENT] button was clicked is automatically inserted. You may change this time as necessary.
Modality	Displays the modality of the exam. The abbreviation for x-ray is DX.
Comments	Provides a space for any notes or information not listed in any other field.
[START EXAM]	Displays the Select Protocol screen in preparation for making exposures. Refer to Chapter 6: Image Acquisition-Select or Change Protocols (p. 6-10) for more information.This also adds the patient name to the Worklist. **NOTE:** This button does not appear if the Patient Information screen is opened from the Image Viewer or Image Management screens.

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Function	Description
[SAVE]	Adds the patient to the Worklist or saves changes and closes the Add Patient/ Patient Information screen. • If the Save button is selected but all of the data fields have not been filled in, a new patient is created anyway. • If no patient name has been entered, then the patient name will be listed as "New Patient". This allows you to start an exam quickly.
[CANCEL]	Erases all newly entered information and closes the Add Patient/Patient Information screen without updating the Worklist.

Add Patient

Use this procedure to enter the patient's information into your system.

1. Open the Worklist screen.
   - The Patient Worklist screen appears.
2. Press [ADD PATIENT].
   - The Add Patient screen appears.
3. Enter the patient information.

CAUTION: Make sure the patient's name, ID number, birth date, and gender information are entered correctly.

4. Press [SAVE] or [START EXAM].
   - Press [SAVE] to add the patient to the Worklist and return to the Worklist screen.
   - Press [START EXAM] (if available) to add the patient to the Worklist and begin Acquisition.
   - Press [CANCEL] to close the Add Patient screen without saving changes.

NOTE: For a new exam on a existing patient, the patient information cannot be edited.

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Edit Patient Information

Patient information can only be edited before any procedure has been opened.

NOTE: You may only edit patient information for one procedure at a time. If multiple procedures are selected, the [PATIENT INFORMATION] button is disabled.

1. Select the procedure from the Worklist.
2. Press [PATIENT INFORMATION].
   - The Patient Information screen appears.
3. Edit the information as necessary.
4. Press [SAVE] to record the changes and return to the Worklist.
   - Pressing [CANCEL] closes the Patient Information screen without saving changes.

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Chapter 6: Image Acquisition

This section details the process of acquiring images using the GE Digital Detector or free cassette.

Refer to Appendix A: Image Pasting for information about conducting an Image Pasting exam.

Topics covered include:

- Overview (p. 6-1)
  - Touch Screen Control (p. 6-8)
- Re-start Completed or Discontinued Exams (p. 6-9)
- Resume Suspended Exams (p. 6-10)
- Select or Change Protocols (p. 6-10)
  - Automatic Protocol Recognition (APR) (p. 6-11)
- Conduct a Digital Exam (p. 6-12)
- Conduct a Cassette Exam (p. 6-14)
- Conduct an Emergency Exam (p. 6-16)
- End Exam (p. 6-16)
  - Suspend (p. 6-17)
  - Close (p. 6-17)
  - Discontinue (p. 6-17)

Overview

The Acquisition screen (Figure 6-1) is where the exam is set up and exposure details are adjusted. This screen appears when you press the [START EXAM], [EMERGENCY EXAM], or [CASSETTE EXAM] buttons on the Worklist or [START EXAM] from the Add Patient screen.

NOTE: If you pressed the [CASSETTE EXAM] button, the Acquisition screen will present a limited set of options. Refer to Conduct a Cassette Exam (p. 6-14) for more information about cassette exams.

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Figure 6-1 Acquisition screen

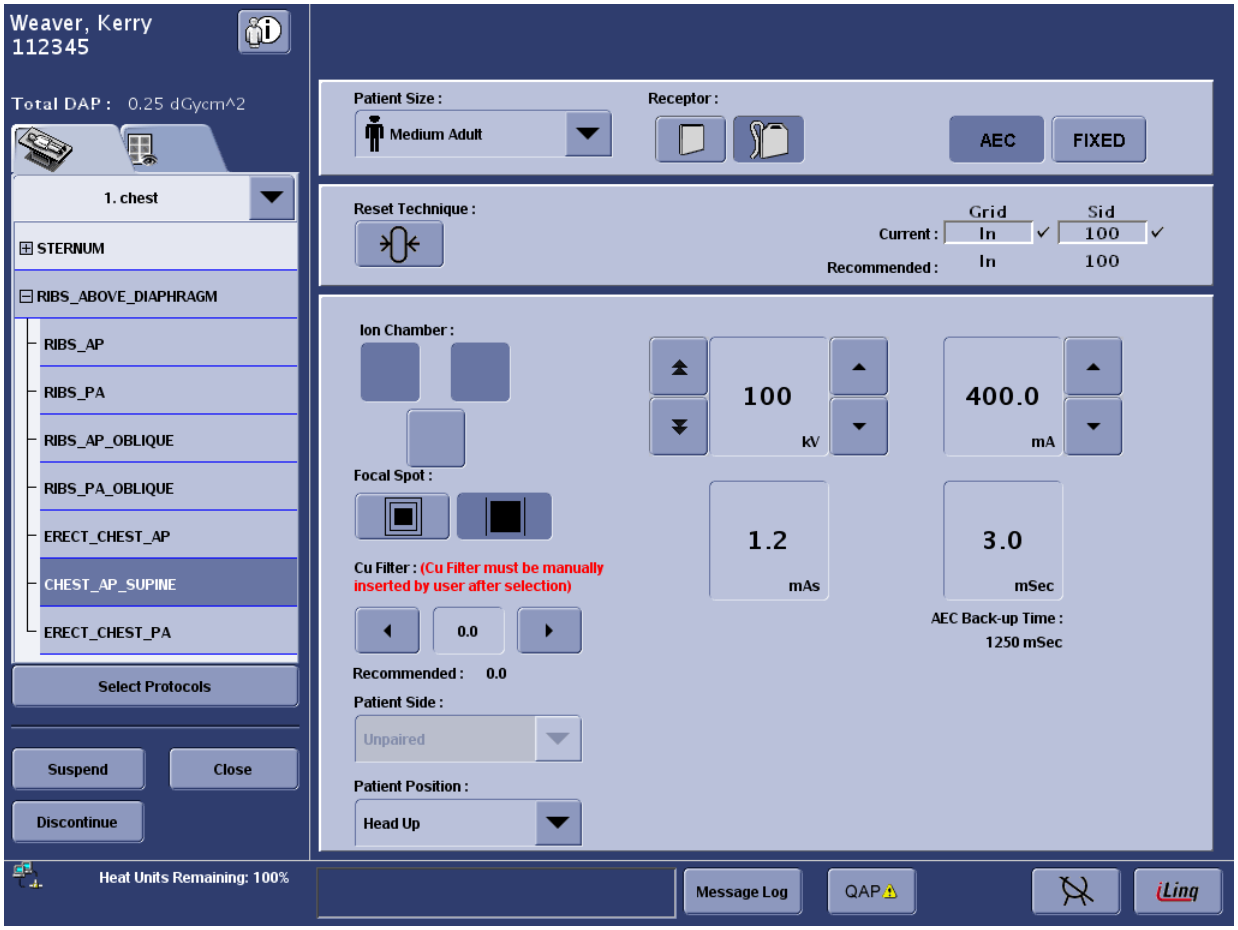

Table 6-1 Image Acquisition functions

Function	Description
patient identification	Identifies the patient name and patient identification number for the current procedure.
[PATIENT INFORMATION]	Displays Patient Information screen for the current procedure. Refer to Chapter 5: Worklist-Add / Edit Patient Information (p. 5-15) for more information.

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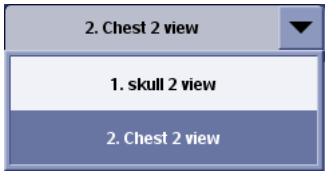
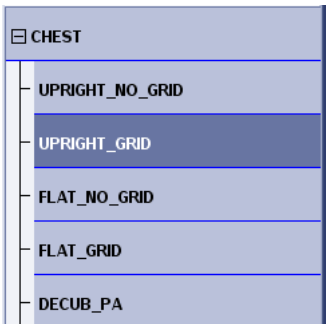
Function	Description
Total DAP: 	Displays the entrance dose estimate multiplied by the field-of-view area at the corresponding distance from receptor after an exposure is taken. **NOTE:** DAP is only displayed if the optional DAP meter is connected to the system. Refer to Chapter 3: System Overview-Options and Accessories (p. 3-21) for more information.
screen switch tab 	Switches between the Acquisition and Viewer screens. **NOTE:** When acquiring multiple images or if you need to retake an image, you must switch back to the Acquisition screen in order to record the exposure.
exam 	If multiple exams were selected from the Worklist, switches between exams for protocol selection, technique adjustment, and acquisition. This drop-down list does not appear if a single exam was selected, or if the exam was initiated with the Emergency Exam or Cassette Exam buttons on the Worklist.
protocol list 	Lists the available views for the exam and shows which view is currently active.
[SELECT PROTOCOLS] 	Brings up the Select Protocols screen to add, remove, or change protocols. Refer to Select or Change Protocols (p. 6-10) for more information.
[SUSPEND] 	Ends the exam with the intent of continuing at a later time. Does not initiate auto send or auto print, if enabled. Refer to End Exam (p. 6-16) for more information.
[CLOSE] 	Closes the procedure. If enabled, [CLOSE] sends billing information to the PACS system, auto sends, and auto prints acquired images. Refer to End Exam (p. 6-16) for more information.

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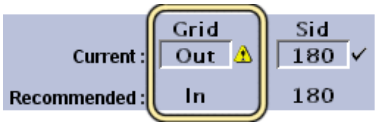
Function	Description
[DISCONTINUE] 	Ends the exam when the procedure has been opened but the exam cannot continue. Refer to End Exam (p. 6-16) for more information.
Patient Size: 	Allows you to choose the size of the patient being x-rayed. Available options are: • Medium Pediatric (toddlers to 5 years old) • Small Adult • Medium Adult • Large Adult **NOTE:** Pediatric techniques are set at different system speeds then adult techniques. For example, the system speed for a pediatric exam of 70 kV at 32 mAs is 800. The default system speed for an adult exam of 70 kV at 32 mAs is 400.
Receptor: 	Selects the receptor for the protocol. In order from left to right, the options are: • Free Cassette • GE Digital Detector **NOTE:** The generator limits exposure time to two (2) seconds for both receptors.
[AEC] and [FIXED] (mode) 	Selects AEC or FIXED modes. Refer to Chapter 7: Automatic Exposure Control (AEC) for more information about AEC.
Reset Technique: 	Resets the technique to the default protocol settings.
Grid position 	Shows the current grid position, the recommended grid position for this technique. The alert icon indicates that the grid is not in the recommended position. A checkmark indicates that the current grid position matches the recommended position. **NOTE:** Exposure may not be inhibited if the current grid position is not the recommended position.

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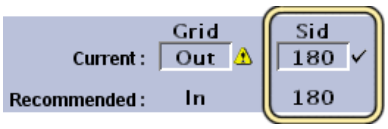
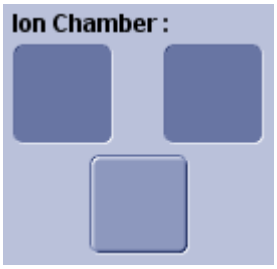
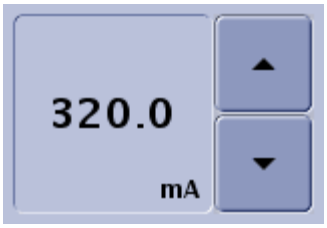
Function	Description
SID 	Shows the current SID, the recommended SID for this technique. The alert icon indicates that the SID is not at the recommended position. A checkmark indicates that the current SID matches the recommended SID. **NOTE:** Exposure may not be inhibited if the current SID is not the recommended SID.
Ion Chamber: (AEC mode only) 	If in AEC mode, selects the ions chambers to use. **NOTE:** When in AEC mode, at least one ion chamber must be selected. Any combination of chambers is allowed. **NOTE:** When in AEC mode, the body part must cover the selected ion chambers in order to achieve the proper exposure. Refer to Chapter 7: Automatic Exposure Control (AEC) for more information about AEC.
kV 	Adjusts the kV. The up/down buttons on the right of the field adjust the kV by one unit. The buttons on the left of the field adjust the kV by 5 units. The kVp selection range is 40-150, in1 kVp increments.
mA 	Adjusts the mA. The mA selection is in Renard steps. The available selections are: 10, 12.5, 16, 20, 25, 32, 40, 50, 64, 80, 100, 125, 160, 200, 250, 320, 400, 500, 640. **NOTE:** Not all mA and mAs selections are available at all kV settings.
mAs 	If in FIXED mode, adjusts the mAs. The mAs selection is in Renard steps. The available selections are: 0.1, 0.12, 0.16, 0.20, 0.25, 0.32, 0.40, 0.50, 0.64, 0.80, 1.0, 1.25, 1.6, 2.0, 2.5, 3.2, 4.0, 5.0, 6.4, 8.0, 10.0, 12.5, 16.0, 20.0, 25.0, 32.0, 40.0, 50.0, 64.0, 80.0, 100.0, 125.0, 128.0, 160.0, 200.0, 250.0, 256.0, 320.0, 400.0, 500.0, 512.0. **NOTE:** Not all mAs selections are available at all kV settings. If in AEC mode, shows the calculated mAs for the current kV and mA after exposure.

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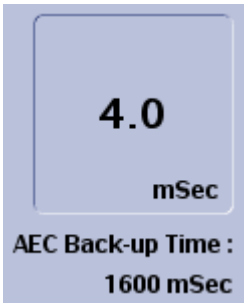
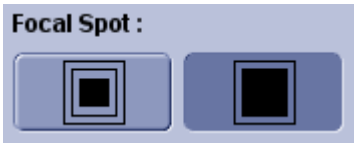
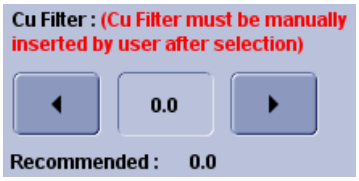
Function	Description
mSec 	Shows the exposure time for the technique with the current kV, mA, and mAs settings after exposure is completed. If in AEC mode, the AEC back-up time is displayed below the Sec field. The AEC default backup time is two (2) seconds.
Focal Spot: 	Selects a large or small focal spot.
CU Filtration: 	Selects the amount of copper filtering. The selectable range is 0.0mm, 0.1mm, or 0.2mm. The recommended amount of filtering is shown below the selection area. **WARNING: The Cu filter selection on the screen is display only. The Cu Filter must be manually inserted by the operator after selection.** Refer to Chapter 3: System Overview-Copper Filtration (p. 3-21) for more information.
Patient Side: 	If conducting an exam on paired anatomy (for example, extremities), selects the side of the patient being x-rayed. Options are: • Both • Left • Right If conducting an exam on unpaired anatomy, the control is disabled and displays “Unpaired”, as shown here.

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Function	Description
Patient Position: 	Selects the patient position relative to the detector. The available options change if the currently selected protocol view is for paired or non-paired anatomy. For paired anatomy, the available options are: • Digits to Head • Digits to Feet • Digits to Front • Digits to Back For unpaired anatomy, the available options are: • Head Up • Head Down **NOTE:** The above lists of positions for paired and unpaired anatomy are a general guidelines only. Some views have different options.
network connection status 	Appears when the Definium 5000 is connected to the hospital network.
Heat Units Remaining 	Shows the percentage of heat units remaining. Refer to Chapter 4: General Information-X-ray Tube Heat Units Remaining (p. 4-8) for more information.
system status 	Displays the last system status message. **NOTE:** To clear the system status area, open the Message Log and close it again. Refer to Chapter 4: General Information-System Status and Messages (p. 4-7) for more information.
[MESSAGE LOG] 	Brings up the message log since the last system re-start. Refer to Chapter 4: General Information-System Status and Messages (p. 4-7) for more information.

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Function	Description
[QAP] 	When the yellow alert icon is present, indicates that QAP should be performed to ensure continued image quality. **NOTE:** QAP cannot be performed when the Image Acquisition or Image Viewer screens are displayed. End the exam before attempting to perform QAP. Refer to Chapter 11: Quality Assurance Process and Maintenance for more information.
[EXPOSE HOLD] 	Appears when there is some condition that prevents an x-ray from being taken. Press the button to view a list of all errors and interlocks that are preventing the exposure. The items are removed from the list as they are corrected. The button disappears when all errors and interlocks are corrected.
[iLinq] 	Connects to iLinq remote support services. Refer to Chapter 4: General Information-iLinq (p. 4-9) for more information.

Touch Screen Control

The touch screen control on the Tube-collimator assembly (Figure 6-2) displays or allows adjustment of the exam technique. Refer to Chapter 3: System Overview-Position System from Touch Screen Console (p. 3-11) for more information about the tube collimator assembly and positioning functions available from the touch control screen.

1. Press [GENERATOR] on the touch panel control (if necessary).
2. Press the buttons to adjust the technique in the same manner as you would on the Image Acquisition screen.

Figure 6-2 Touch Screen Console

FIXED mode AEC mode

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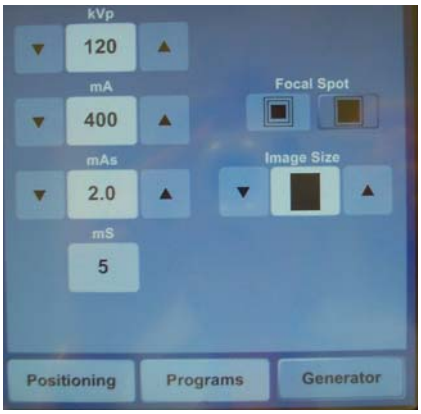
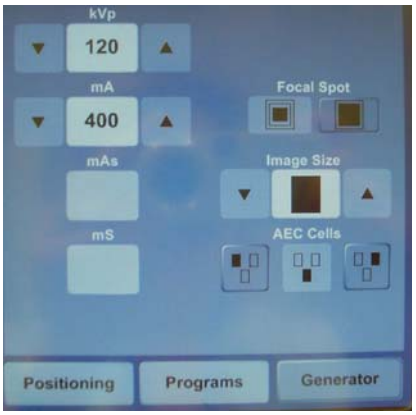


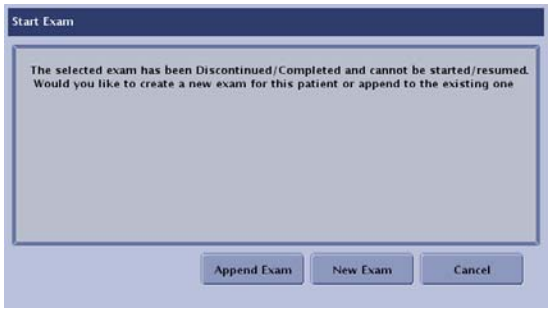


Re-start Completed or Discontinued Exams

Procedures with a Status of "Completed" or "Discontinued" cannot be re-opened. However, you may create a new exam or append the existing exam.

1. Select the procedure(s) from the Worklist.
2. Press [PATIENT INFORMATION] to verify the patient, if necessary.
3. Press [RESUME EXAM].
   - A message appears: "The selected exam has been Discontinued/Completed and cannot be started/resumed. Would you like to create a new exam for this patient or append to the existing exam?"

Figure 6-3 Start a discontinued or completed exam message


Start Exam
The selected exam has been Discontinued/Completed and cannot be started/resumed.
Would you like to create a new exam for this patient or append to the existing one
Append Exam
New Exam
Cancel

4. Press the button of the action to perform.
   - [APPEND EXAM] creates a new series within the existing exam and opens the Select Protocols screen.

NOTE: The new exam will be placed under the same accession number as a new series. Check your facility's conformance standards before selecting this option because it may effect HIS/RIS or PACS formats.

- [NEW EXAM] creates a new exam and series for the patient and opens the Select Protocols screen.
- [CANCEL] closes the message and returns you to the Worklist.

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5. Refer to Select or Change Protocols (p. 6-10) to continue with the exam.

Resume Suspended Exams

Suspended exams may be resumed at any time. The process of resuming a suspended exam is the same as starting a new exam.

1. Select the exams from the Worklist.
2. Press [RESUME EXAM].

NOTE: Protocol selections and technique changes are not saved in a suspended exam. Protocols must be reselected and techniques must be re-set.

Select or Change Protocols

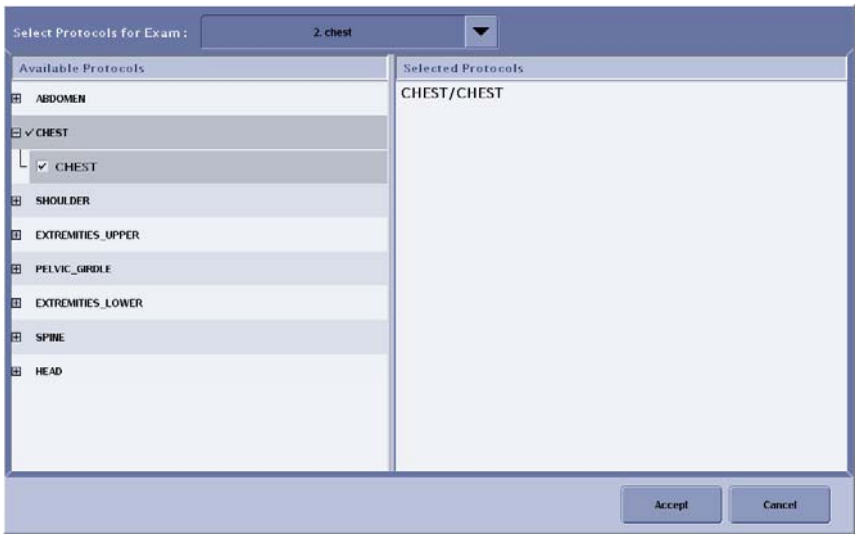
The Select Protocols screen (Figure 6-4) appears when you press [START EXAM] on the Worklist or Add Patient screen or when you press [SELECT PROTOCOLS] on the Acquisition screen.

The select protocols screen is divided into two halves: Available Protocols on the left and Selected Protocols on the right.

- Available Protocols lists all the protocols currently listed in the database, categorized by anatomical region: for example, head, chest, spine, and abdomen. Each category expands to show the exam(s) for that category.
- Selected Protocols lists all currently selected protocols in the following format: anatomy / exam. This list automatically updates as protocols are selected or removed.

Refer to Chapter 10: Set Preferences-Protocols (p. 10-40) for information on adding protocols to the protocol database.

Figure 6-4 Select Protocols



Use this process to select or change protocols for a procedure.

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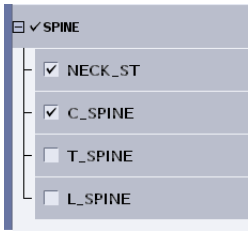
1. If multiple procedures were selected from the Worklist, select the procedure from the drop-down list.

Figure 6-5 Select procedure

2. Press on an anatomical category (Available Protocols side) to open it.
   - The category expands to show the available exams.
   - Press on the anatomical category name again to close it.
3. Press on an exam to select it.
   - A checkmark appears in the box to the left of the exam name.
   - A checkmark appears next to the category name. This indicates that the category has at least one exam selected.

Figure 6-6 Selected exams



   - The category and exam name appear in the Selected Protocols list.
4. Press the exam again to de-select it.
   - The category and exam name are removed from the Selected Protocols list.
5. Repeat process until all exams are selected for all procedures.
6. Press [ACCEPT] when finished.
   - The Select Protocols screen closes.
   - The Acquisition screen appears.
   - [CLOSE] removes the selections and returns you to the Worklist.
7. Refer to Conduct a Digital Exam (p. 6-12) or Conduct a Cassette Exam (p. 6-14) to continue the exam.

Automatic Protocol Recognition (APR)

Automatic Protocol Recognition (APR) is a feature that will eliminate the protocol selection process and take you directly to the Acquisition screen for the appropriate exam view after selecting the patient from the Worklist. This feature is designed to help provide better ease of use.

For APR to function, the system protocol database must have matching values for the Requested Procedure Code from the selected Exam in the HIS/RIS Worklist. The Acquisition screen will open with the first view of the first exam selected.

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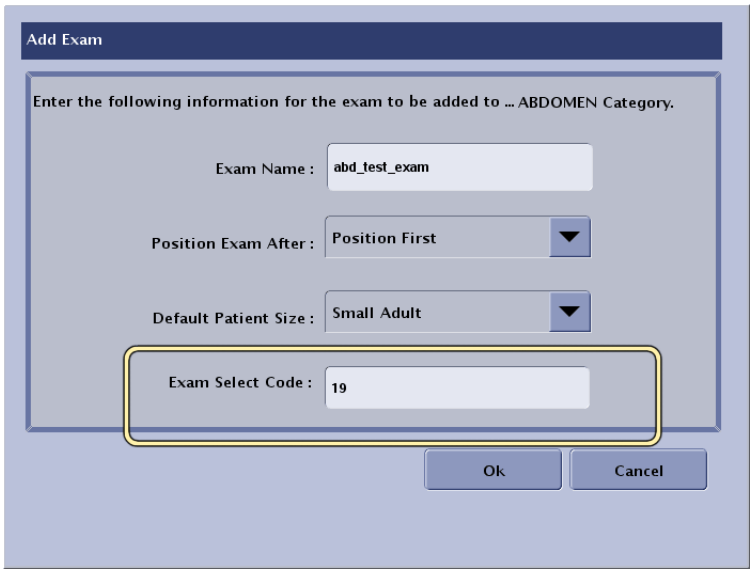
- If multiple Scheduled Procedure Step (SPS) entries are selected at the same time, the error message will indicate which protocol codes received from the HIS/RIS did not match.
- If your system has APR enabled but you have manually added a patient or began an Emergency Exam, the following message will appear after you click the [START EXAM] button: "None of the protocol codes match with any of the existing protocols in the database. Please select them manually." Click the [OK] button to dismiss the message and proceed to select the protocols as previously described.

You are still able to change or select additional protocols from the Acquisition screen using the previously described process.

APR codes are added or edited through the **Exam Select Code** field on Add Exam or Edit Exam screen (Figure 6-7) of the Edit Protocol Database preferences. Refer to Chapter 10: Set Preferences-Add or Edit Exam (p. 10-44) for more information.

Figure 6-7 Add Exam screen



Conduct a Digital Exam

This section describes the adjustments required when conducting a digital exam.

Follow this process to conduct an exam using the GE Digital Detector.

NOTE: If you need to interrupt the exam and resume it at a later time, press the [SUSPEND] button. You will be returned to the Worklist.

1. If multiple procedures were selected from the Worklist, select the procedure from the exam drop-down list.
2. Select the **Exam** and **View** to perform from the protocol list.
3. Select the **Patient Size**. The system default is Medium Adult.

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NOTE: To optimize processing for the best image quality, Patient Size should be confirmed for each view. Available options are:

- Medium Pediatric (toddlers to 5 years old)
- Small Adult
- Medium Adult
- Large Adult

WARNING: **It is critical to select the proper patient size on the Acquisition screen. The incorrect Patient Size may result in an unnecessarily large radiation dose or multiple exposures.**

4. Select the **GE Digital Detector receptor**, if necessary.

Figure 6-8 Receptors: GE Digital Detector selected

5. Select the Mode: **AEC** or **FIXED**, if necessary.
6. If in AEC mode, change the selected **Ion Chambers**, if necessary.
   - Selected (active) AEC cells will appear as darker buttons on the acquisition screen.

IMPORTANT!: If in AEC mode, position the patient so that the anatomy of interest is centered over the selected AEC cells. The body part must cover the selected ion chambers in order to achieve the appropriate exposure.

7. Make other technique adjustments as necessary.
   - You are able to adjust the kV, mA, and Focal Spot.

NOTE: Press [RESET TECHNIQUE] at any time to reset the technique to the default protocol settings.

NOTE: You may also make technique adjustments from the Touch Screen Console on the tube-collimator assembly. Refer to Touch Screen Control (p. 6-8) for more information.

8. Change the **Cu Filter** selection, if necessary.

WARNING: **The Cu filter selection on the screen is display only. The Cu Filter must be manually inserted into the collimator by the operator after selection.**

9. Confirm or adjust the **Patient Side,** if applicable.
10. Collimate and shield as appropriate for the exam.
11. Have the patient suspend respiration, if required.

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12. Make exposure using the hand switch.
    - The image appears on Image Viewer screen.

NOTE: It takes about 9 seconds for a fully processed image to appear on the Image Viewer screen.

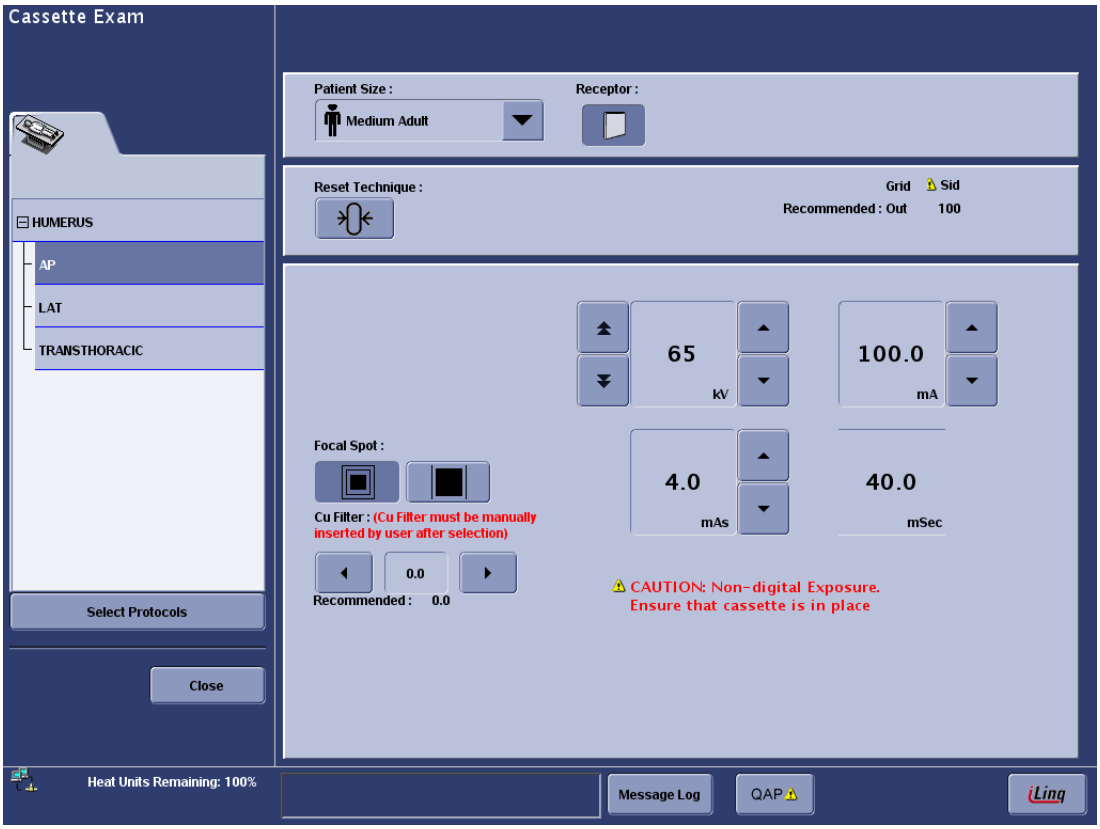
13. Press the **Acquisition** tab to switch back to the Acquisition screen.

Conduct a Cassette Exam

The Cassette Exam function takes an x-ray without digital image acquisition and storage or electronic information sending and retrieval. This is for use with a traditional Film Screen or CR cassette.

When the cassette receptor is selected, a message appears near the bottom of the screen: "CAUTION: Non-digital Exposure. Ensure that film is in place."

Figure 6-9 Cassette exam Acquisition screen



Follow this process to conduct a Cassette Exam.

1. Press [CASSETTE EXAM] from the bottom of the Worklist screen.

NOTE: Because a cassette exam does not use digital image storage, you do not select procedures from the Worklist.

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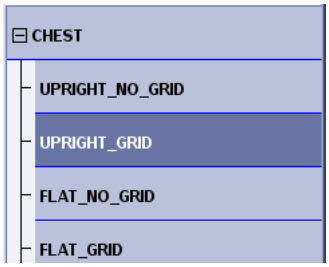
Figure 6-10 [CASSETTE EXAM] button on Worklist

- The Select Protocols screen appears.

2. Select the protocols to perform.
3. Press [ACCEPT].
   - The Acquisition screen appears in Cassette Exam mode.
4. Select the Exam and View to perform from the protocol list.



5. Make technique adjustments as necessary for the appropriate body part being imaged: **kV** and **mAs**

NOTE: For film and CR cassette work, use your site's routine techniques as with any other system. For ease of use, these techniques can be programmed into the protocol database. Refer to Chapter 10: Set Preferences-Edit Protocol Database (p. 10-42) for more information.

6. Change the **Cu Filter** selection, if necessary.

WARNING: The Cu filter selection on the screen is display only. The Cu Filter must be manually inserted into the collimator by the operator after selection.

7. Position the patient.
8. Collimate and shield as appropriate for the exam.
9. Have the patient suspend respiration, if required.
10. Make exposure using the hand-switch.
11. Press [CLOSE] to end the exam.
    - The Worklist appears.
12. Process the cassette as necessary, depending on the media.

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Conduct an Emergency Exam

Emergency Exam is a function that allows a patient to be x-rayed without selecting the patient from the Worklist or adding the patient to the Worklist.

Figure 6-11 Emergency Exam button

Emergency Exam is used in the following situations:

- Medical emergency – The patient needs an x-ray taken immediately.
- No patient information available – There is no patient information to enter due to the patient's medical condition. For example, the patient was found unconscious with no identification.

When the [EMERGENCY EXAM] button is pressed, the system assigns a unique tracking number as the Patient Name. The tracking number is the word "NEW" followed by a date and time stamp of the second the Emergency Exam button was pressed. For example: NEW070422140345. In this example, the number sequence means that the exam was initiated in year 07, month 04, day 22, hour 14, minute 03, and second 45.

The tracking number is used as the Patient Name on image annotation and as the Patient ID.

NOTE: When the patient information becomes available, images can be copied into the appropriate Worklist selection. The selection can be populated to the Worklist either by HIS/RIS or manual entry. Refer to Chapter 9: Image Management-Open Exams and Images (p. 9-8) for more information.

Once initiated, an emergency exam is conducted the same way as any other exam.

Follow this process to conduct an emergency exam.

1. Press [EMERGENCY EXAM] from the bottom left of the Worklist.
   - The Select Protocols screen appears. Refer to Select or Change Protocols (p. 6-10) for more information.
2. Select the protocols for the exam.
3. Press [ACCEPT].
   - The Acquisition screen appears.
4. Select the protocol to perform from the Protocol List.
5. Acquire images. Refer to Conduct a Digital Exam (p. 6-12) or Conduct a Cassette Exam (p. 6-14) for more information.

End Exam

There are several ways to end an exam: Suspend, Close, and Discontinue. Each method is used for a specific purpose to cover a variety of different situations.

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Figure 6-12 Buttons used to end exams

Suspend

Suspend is for situations when you must leave the exam but intend to resume it at a later time. Suspending an exam does not initiate auto send or auto print functions (if enabled). Images acquired from a suspended exam do not appear on the Image Management screen. Any acquired images are stored in a temporary database until they are committed to the permanent storage database upon closure of the exam.

Close

Close is used when the exam is complete; that is, you have acquired all images and do not intend to continue. If enabled, Close sends the images to PACS and initiates auto print and auto send functions. The images are committed to the permanent storage database and the exam appears on the Image Management screen. This is the only exam end option available when conducting a cassette exam.

Discontinue

Discontinue an exam when you have opened the procedure but cannot continue the exam. Any images that were acquired are marked so that they are not used by PACS.

When an exam is discontinued, you must provide the reason for discontinuing the exam. The system sends the status and reason together to the HIS/RIS.

The available reasons are:

- Doctor cancelled procedure
- Equipment failure
- Incorrect procedure ordered
- Patient allergic to media/contrast
- Patient died
- Patient refused to continue procedure
- Patient taken for treatment or surgery
- Patient did not arrive
- Patient pregnant
- Change of procedure for correct charging
- Duplicate order
- Nursing unit cancel
- Incorrect side ordered
- Discontinue for unspecified reason
- Incorrect worklist selection

NOTE: The reason for discontinuing an exam cannot be seen on the Worklist or Patient Information. The information is added to the DICOM header.

Use this procedure to discontinue an exam.

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1. Press [DISCONTINUE] from the bottom of the Acquisition screen.
   - A message appears: “Please select a reason for discontinuing this exam.”
2. Select the option that best describes why the exam is being discontinued.
   - Choose “Discontinue for unspecified reason” if no other options describe the current situation.
3. Press [OK].
   - The message closes and the Worklist screen opens.
   - The status of the procedure changes to “Discontinued” on the Worklist.
   - If multiple procedures were selected, the discontinued status applies to all procedures that were open when the exam was discontinued.
   - Press [CANCEL] to close the message and return to the Acquisition screen.

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Chapter 7:
Automatic Exposure Control (AEC)

The Automatic Exposure Control automatically terminates an X-ray exposure to produce optimum quality images. AEC automatically compensates for changes in patient thickness, opacity, and different technique factors of mA, kVp, and SID. Proper patient positioning is very important. In extreme cases of misalignment, some radiation bypasses the patient and ends the exposure prematurely, causing underexposed images. Conversely, positioning the heaviest patient area over the detector sensing area may cause overexposed image areas. You should become familiar with the size and location of each detector. With such knowledge, you can develop proper positioning techniques of each anatomical area and be able to duplicate your positioning for every patient. This also helps you produce uniform quality images regardless of patient thickness or opacity. This system feature, AEC, automatically selects the mAs and exposure time, eliminating the need for you to select them.

Many default techniques are AEC based in order to optimize image processing. The exposure time and mAs are automatically selected when you are in AEC mode, producing uniform quality images.

Topics covered include:

- Acquisition Screens (p. 7-1)
- Ion Chamber Detectors (p. 7-4)
- Applications for Detector Sensing Areas (p. 7-4)
- AEC Limitation Messages (p. 7-7)
- Acquire AEC Images (p. 7-8)

Acquisition Screens

Figure 7-1 shows an example of an AEC exposure setup. For AEC mode, exposure time and mAs are not selectable; therefore, these parameters are empty on the Acquisition screen. This example provides an example an AEC exposure with Chest AP selected.

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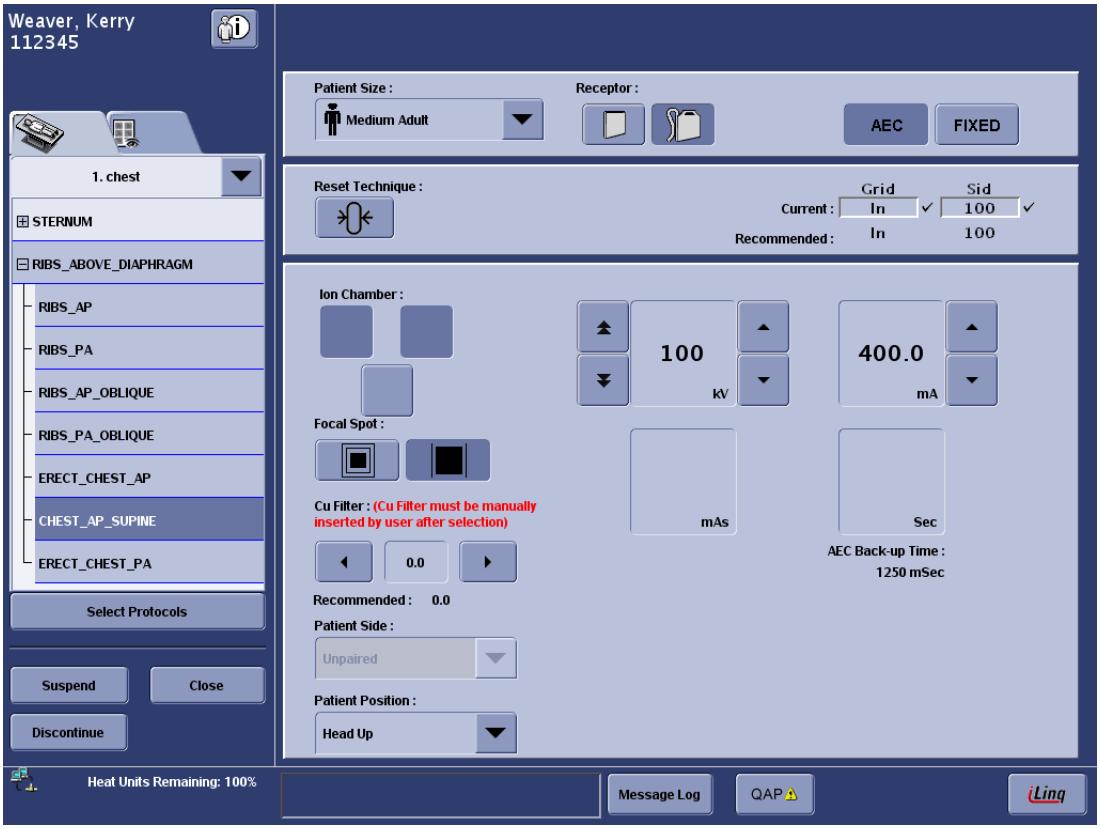
Figure 7-1 Example AEC setup of a normal chest exposure



After the exposure has been completed, the console automatically displays the exposure time (mSec) and mAs values (Figure 7-2).

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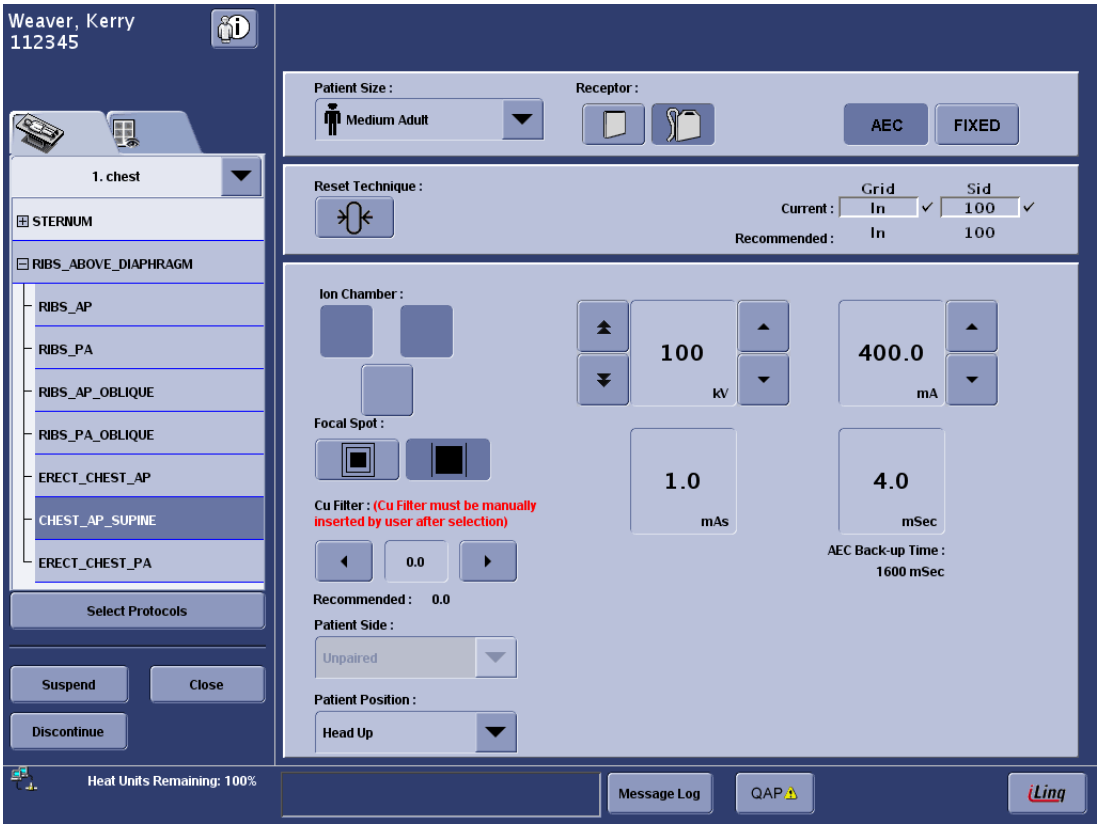
Figure 7-2 Example AEC exposure completed (normal operation)



The Applications software sets two limits for AEC operation: 512 is the maximum mAs. 2 seconds (2000 milliseconds) is the maximum exposure time.

NOTE: When either one of the above limits is reached, the Applications software terminates the exposure. For example, Equation 7-1 demonstrates that with a console selection of 250 mA, the system reaches the 2000 millisecond maximum exposure limit before it would reach the 512 mAs limit.

Equation 7-1 AEC exposure limit calculation

(the 250 mA console selection) X (2000 milliseconds) = 500 mAs

NOTE: The Applications software also uses a built-in formula to set limits for AEC operation in addition to the two limits stated above. This formula limits mAs to a value less than 512 mAs and exposure time to a value less than 2000 msec, depending upon the technique selected. Due to these limitations, you may reach an AEC limit even with a mAs value less than 512 mAs and with an exposure time less than 2000 msec. If either of these events occur, the Applications software terminates the exposure.

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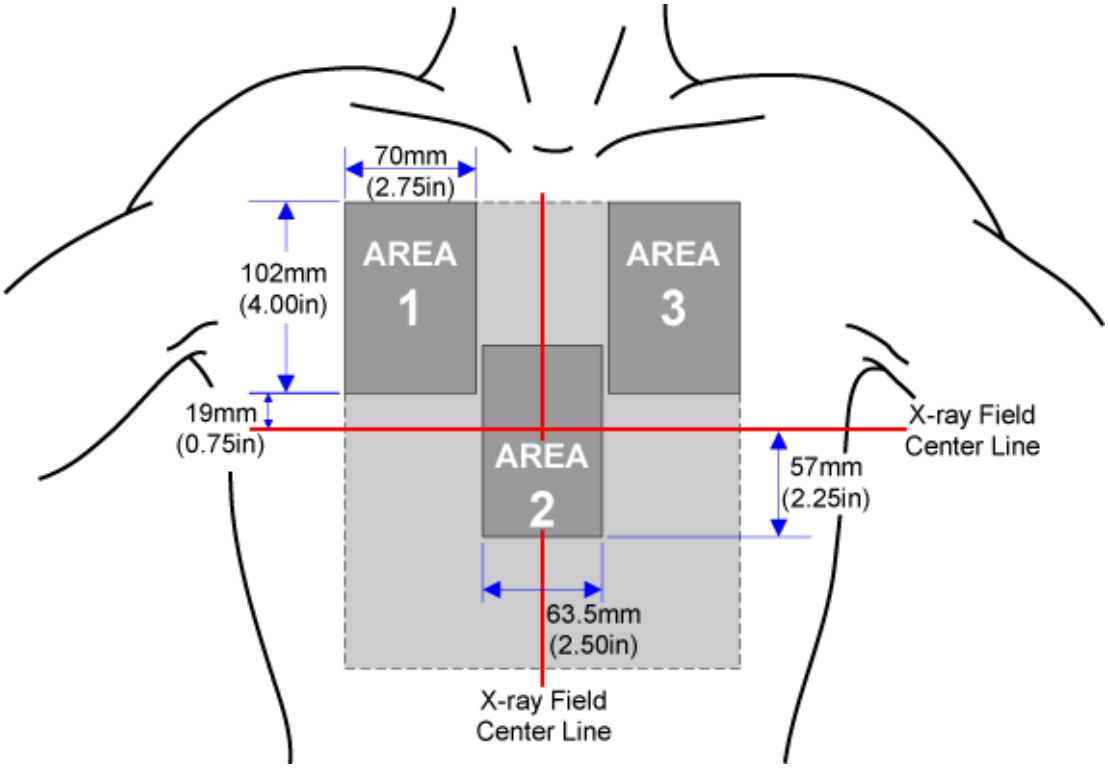
Ion Chamber Detectors

Ion Chamber Detectors have three sensing areas (Figure 7-3). Sensing Area 2 is located at the center of the X-ray beam. While Area 1 and Area 3 can be selected to cover an exposure of two symmetrical parts of the body, such as the lungs or the kidneys, care should be taken to center the patient and detector areas accordingly.

Figure 7-3 Sensing areas



The position of the sensing areas are shown in relation to the area of a 210 mm x 248 mm (8.25in x 9.75in) Collimator Light Field.

Applications for Detector Sensing Areas

The detector sensing areas should be used as described in the following sections. You should become familiar with their locations and recommended use. The sensing areas are numbered 1 through 3.

Areas 1 and 3

Areas 1 and 3 are used to cover symmetrical body parts. For example, acquiring a chest radiograph includes the lungs, which are proportional parts of the body. In this application, Area 1 and 3 must be located in line with radiation transmitted through the left and right lung fields. This ensures these areas are not influenced by variations in tissue opacity caused by the heart or vertebrae.

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If the patient is improperly positioned and the sensing areas are exposed to direct radiation, the photo timed exposures will be too short and the films underexposed. The opposite is true if the patient's thoracic spine or sternum are positioned over the sensing areas.

NOTE: Areas 1 and/or 3 are to be used with full-sized fields of 10x12 inches (254x305mm) or larger.

Area 2

The center of the X-ray beam is Area 2. The basic positioning requirements are also important when using this area. Misalignment may result in unusable images. Care should be taken when positioning the anatomical area of interest over Area 2.

When using Area 2, you may want to align the X-ray tube to the center line of Area 2 before positioning the patient. It is also recommended you collimate the light field to an area of 8¼x9¾ inches (210x 248 mm). Your light field will then be centered on Area 2 and encompasses the inner sides of Area 1 and 3. Then, when you are positioning your patient and using only Area 2, a light field 2½x4½ inches (54x114 mm), if properly centered, defines that area and can be used to align a specific region of the body.

Positioning of the patient's anatomical area of interest within the light field and readjusting the light field to the desired size, ensures the detector sensing area is aligned with the area of interest in the patient.

NOTE: Area 2 must be selected by itself whenever the X-ray field is less than 10x12 inches (254x305 mm) and in instances where the collimator field size is reduced to less than 10x10 inches (254x254 mm).

Applications

Applications for the detector sensing areas are given in Table 7-1 with the areas appearing as three adjacent square buttons. The dark-colored buttons indicate the currently selected area or areas.

When in AEC mode, at least one ion chamber must be selected. Any combination of chambers is allowed.

Figure 7-4 AEC Areas

NOTE: When creating or editing protocols, the ion chambers are named L, R, and C on the Exam Menu screen. Refer to Chapter 10: Set Preferences-Protocols (p. 10-40) for more information.

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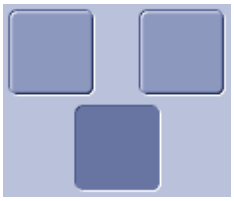
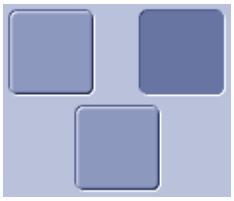
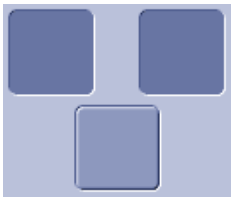
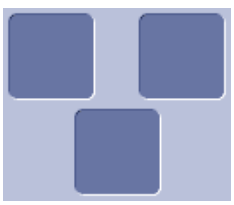
Table 7-1 Detector sensing areas

Area(s) Selected	Application	Patient Positioning
Area 2 	Controls the exposure for an area of interest at the center of the X-ray field.	The patient's area of interest is in the X-ray field center.
Area 1	Controls the exposure for an area of interest at the upper left quadrant of the full size radiograph.	The patient's area of interest is in the upper left quadrant of the X-ray field.
Area 3 	Controls the exposure for an area of interest at the upper right quadrant of the full size radiograph.	The patient's area of interest is in the upper right quadrant of the X-ray field.
Areas 1 and 3 	Controls the exposure for two symmetrical parts of the body, such as lungs or kidneys. Because Area 2 is not selected when using areas 1 and 3 for this application, the vertical column should not affect the exposure, providing the patient is correctly positioned.	The patient's area of interest is aligned with sensing Areas 1 and 3.
All Areas 	Controls the exposure to allow the average density of the entire radiograph to approximate the value of the pre-selected density.	The patient's area of interest is within the boundary of the X-ray field.

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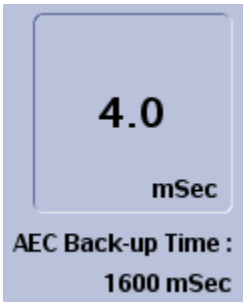
AEC Limitation Messages

The AEC feature optimizes patient images and helps you to obtain precise exposures. Many default techniques are AEC based in order to optimize image processing. The exposure time and mAs are automatically selected when you are in AEC mode, producing uniform quality images. The system displays messages to inform you when the AEC feature reaches its limit.

When acquiring AEC images, the AEC Back-up time is displayed below the mSec area. After the exposure is taken, the current mSec is displayed (Figure 7-5).

Figure 7-5 mSec and AEC back-up time on Acquisition screen



When an AEC exposure reaches the back-up time limit, a message appears on screen: “The AEC back-up time has been reached.” Click [OK] to close the message. The system will not allow you to continue taking exposures for the current protocol. To resume image acquisition, select another protocol and continue the exam.

The backup time is calculated from the following three conditions:

- A 2000 millisecond limit
- A 500 mAs limit or 512 mAs limit (based on the nearest Renard step)
- An X-ray tube protection ‘formula’ limit

In this instance, the maximum exposure time reached may cause the digital image to be lighter than desired. You may wish to change the mA selected to avoid reaching one of these limitations in a subsequent exposure.

In addition to the limits provided by the Applications software, the system also has a maximum mAs limit for AEC operation.

- The maximum mAs limit ensures that if an AEC exposure exceeds 512 mAs, the maximum mAs limit terminates the exposure at values less than 600 mAs.
- Whenever the maximum mAs integrator limit (550 mAs ± 10 mAs) is reached during an AEC exposure, a message appears: “The AEC back-up time has been reached.”

NOTE: The regular occurrence of this message may be evidence of a malfunction in your system. Call your service engineer to assess the situation.

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Acquire AEC Images

Acquiring images in the AEC mode requires precise light alignment and patient positioning.

Refer to Chapter 6: Image Acquisition for more information about conducting an exam.

WARNING: Collimation must be active over the AEC chambers being used or FIXED mode must be used in order to prevent possible patient over-exposure.

Use this process to produce images with the AEC feature.

1. Open an exam from the Worklist and select the protocols.
   - The Acquisition screen appears.
2. Select the protocol to perform.
3. Change the **Patient Size**, if necessary.

WARNING: It is critical to select the proper patient size on the Acquisition screen. The incorrect Patient Size may result in an unnecessarily large radiation dose or multiple exposures.

4. Change the **Receptor,** if necessary.
5. Click [AEC], if necessary.
   - Depending on the current protocol, AEC may already be selected by default.
   - The AEC mode displays the Ion Chamber selections.
   - The Fixed mode removes the Ion Chamber selections.
   - You are able to alter this selection at any time to accommodate the requirements of a specific examination.
6. Change the selected **Ion Chambers**, if necessary.
   - Selected (active) AEC cells will appear highlighted on the acquisition screen.
7. Make other technique adjustments as necessary.
   - You are able to adjust the kV, mA, and Focal Spot.
8. Confirm or select the **Cu Filter**, if necessary.

WARNING: The Cu filter selection on the screen is display only. The Cu Filter must be manually inserted by the operator after selection.

9. Position the patient so that the anatomy of interest is centered over the selected AEC cells.

NOTE: The body part must cover the selected ion chambers in order to achieve the appropriate exposure.

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10. Collimate the light field to encompass the detection area being used.
11. Collimate to the desired area. This ensures the detector sensing area is aligned with the patient's anatomy.
12. Confirm the Patient Position. Change if necessary.
13. Make the exposure.
14. If the AEC Back-up Reached message appears: Click [OK].
    - The message closes.
15. Select another protocol and continue the exam.

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Chapter 8: Image Viewer

The Image Viewer screen (Figure 8-1) appears on the touch panel once an exposure is taken in a live exam or when an image series is chosen from the Image Management screen for review. This screen is where images are adjusted and viewed.

NOTE: This chapter covers the functions used for standard exams. Refer to Appendix A: Image Pasting for information about using the Image Viewer for Image Pasting exams.

Topics covered include:

- Overview (p. 8-1)
- Tool Panel Selection (p. 8-5)
- Select Images to View (p. 8-5)
- Change Image Display (p. 8-6)
- Adjust Images (p. 8-7)
- Annotate and Mask Images (p. 8-9)
  - Customize System Annotations (p. 8-12)
  - Add Image Annotations (p. 8-13)
  - Delete Image Annotations (p. 8-15)
  - Adjust Image Shutter (Crop Image) (p. 8-15)
- Re-process Images (p. 8-17)
- Determine if Images should be Retaken (DEI) (p. 8-18)
- Change Pointer Controls (p. 8-21)
- Apply Quality Check Indicator (Auto Tag) (p. 8-22)
- Print Images (p. 8-22)
- Send Images (p. 8-27)
- Save Changes to Images (p. 8-27)

Overview

The Viewer shows all images in the study. All series within the study are listed and can be seen in the Viewer.

The left side of the screen contains all the image selection and adjustment tools. Most of the tools are categorized into panels that can be selected to reveal different functions.

The majority of the screen (Figure 8-1) is devoted to image display. The images on the right side of the screen update as adjustments are made. You are able to view single or multiple images at once. When viewing multiple images, an aqua border identifies the currently selected image.

Table 8-1 describes the functions for the Image Viewer screen.

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Figure 8-1 Image Viewer screen

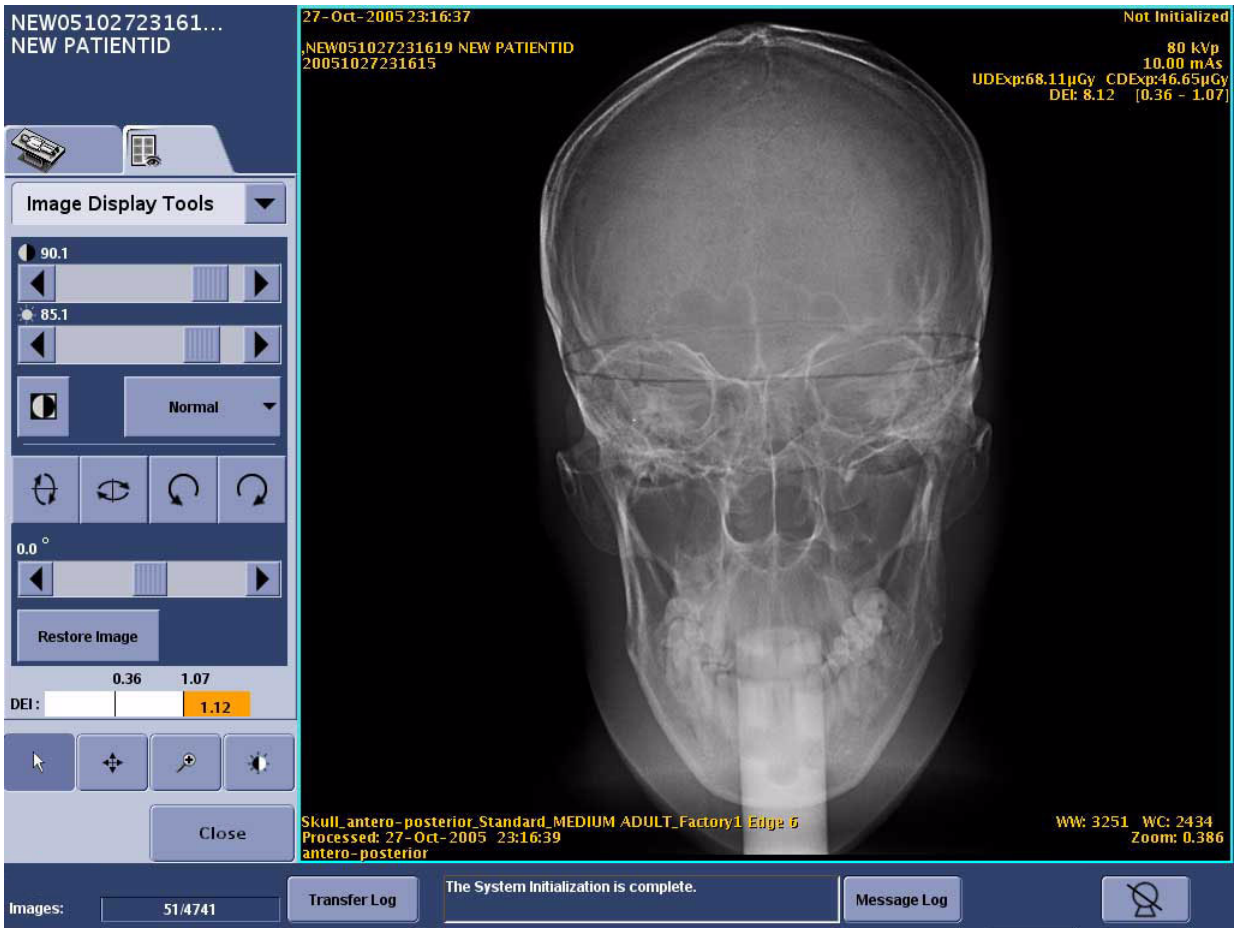

Table 8-1 Image Viewer screen functions

Function	Description
patient Identification	Identifies the Patient Name and Patient ID as entered on the Patient Information screen.
screen switch tab	If in an active exam, allows you to switch back to the Acquisition screen. If viewing images from a completed exam, the Acquisition screen tab is disabled. **NOTE:** When acquiring multiple images or if you need to retake an image, you must switch back to the Acquisition screen in order to record the exposure.

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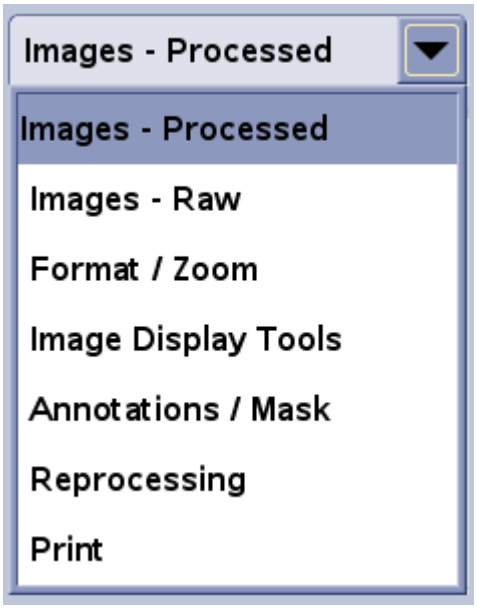
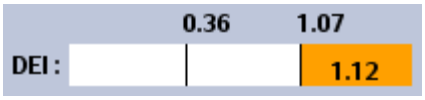
Function	Description
tool selection list 	Switches between different tool panels that allow you to change the image display or manipulate the image. Available options are: • Images – Processed: Shows small previews of all processed images in the selected series and highlights the images currently shown in the Viewer. The images are categorized by exam and series. Refer to Select Images to View (p. 8-5). • Images – Raw: Shows small previews of all raw images in the selected series and highlights the images currently shown in the viewer. The images are categorized by exam and series. Refer to Select Images to View (p. 8-5). • Format/Zoom: Controls how many images appear in the Image Viewer screen at one time and adjusts the magnification of each image. Refer to Change Image Display (p. 8-6). • Image Display Tools: Contains the tools to flip, rotate, adjust brightness, adjust contrast, invert, and apply windowing to images. Refer to Adjust Images (p. 8-7). • Annotations/Mask: Contains the tools to annotate and crop images. Refer to Annotate and Mask Images (p. 8-9). • Reprocessing: Changes the processing settings. Refer to Re-process Images (p. 8-17). • Print: Controls the printing of images. Refer to Print Images (p. 8-22).
DEI (Detector Exposure Index) 	If enabled, displays the dose received by the detector and whether the dose is within an acceptable range for the anatomy. You may need to re-take images that show doses below the acceptable range. Refer to Determine if Images should be Retaken (DEI) (p. 8-18) for more information. **NOTE:** Depending on your system's configuration, the DEI may only show a numerical value. Refer to Chapter 10: Set Preferences-Image Viewer (p. 10-26) to configure the Detector Exposure Index.
pointer controls 	Changes the action of the pointer when pressed and dragged on the image. Refer to Change Pointer Controls (p. 8-21) for more information.

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Function	Description
[CLOSE] 	Closes the Image Viewer screen and prompts you to save any changes to images. Close also initiates auto print and auto push, if enabled. Refer to Save Changes to Images (p. 8-27) for more information.
network connection status 	Appears when the Definium 5000 is connected to the hospital network.
image database size 	Shows how many images are currently saved to the local database and approximately how many more images the database can accommodate.
system status 	Displays the last system status message. **NOTE:** To clear the system status area, open the Message Log and close it again. Refer to Chapter 4: General Information-System Status and Messages (p. 4-7) for more information.
[MESSAGE LOG] 	Brings up the message log since the last system re-start. Refer to Chapter 4: General Information-System Status and Messages (p. 4-7) for more information.
[QAP] 	When the yellow alert icon is present, indicates that QAP should be performed to ensure continued image quality. **NOTE:** QAP cannot be performed when the Image Acquisition or Image Viewer screens are displayed. End the exam or close the images before attempting to perform QAP. Refer to Chapter 11: Quality Assurance Process and Maintenance for more information.
[iLinq] 	Connects to iLinq remote support services. Refer to Chapter 4: General Information-iLinq (p. 4-9) for more information.

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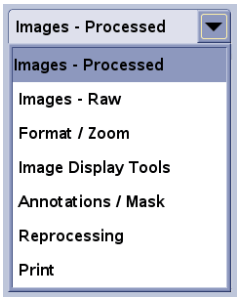
Tool Panel Selection

Different tools and controls are accessed through the Tool Selection list. Press the down-arrow to see a list of all choices.

The following sections describe the tools and their functions.

Figure 8-2 Tool selection list



Select Images to View

The Images - Raw and Images - Processed panels (Figure 8-3) allow you to select images to view. Both the Raw and Processed panels function the same way. The difference is that the Raw panel shows images as they were acquired and the Processed panel shows images that have been processed.

NOTE: When viewing or adjusting images from a completed exam, always work with processed images.

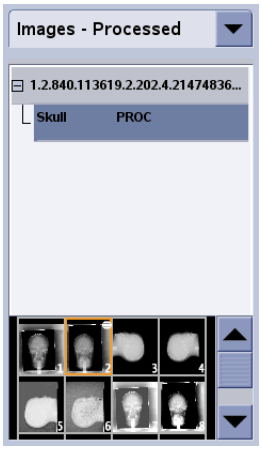
The top half of the tool panel shows the different exams and series that are available. When you select a series, previews (or "thumbnails") of all the images within that series appear in the lower half of the panel.

The panel shows up to 8 image previews at a time. If there are more than 8 images in the series, a scrollbar appears on the right to allow you to see the rest of the images.

The image that is currently selected in the Image Viewer is shown with an orange border and a white dot in the upper right corner.

To view an image, press an image preview.

Figure 8-3 Images – Processed panel



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Change Image Display

The Format/Zoom panel (Figure 8-4) controls how many images appear in the Image Viewer screen at one time and adjusts the magnification of each image.

The Zoom buttons change the size of the selected image shown in the Viewer. Table 8-2 describes the Zoom options.

The Display Format buttons allow you to view up to 9 images at one time.

Figure 8-4 Format / Zoom panel

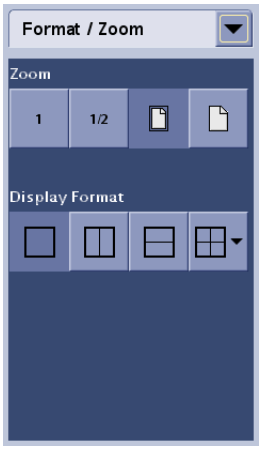

Table 8-2 Zoom tool descriptions

Tool	Description
Zoom One	Shows default the image size where one pixel on the detector equals one pixel on the screen.
Zoom Half	Reduces the image to 50% (four pixels on the detector equals one pixel on screen).
Fit To Screen	Scales the image to fit within the Image Viewer screen.
True Size	Shows the image in the exact size it was acquired from the detector (one centimeter on the detector equals one centimeter on screen).

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Adjust Images

The Image Display Tools panel (Figure 8-5) contains the tools to flip, rotate, adjust brightness, adjust contrast, invert, and apply windowing to the selected image. Table 8-3 describes each tool and how it functions.

Figure 8-5 Image Display Tools panel

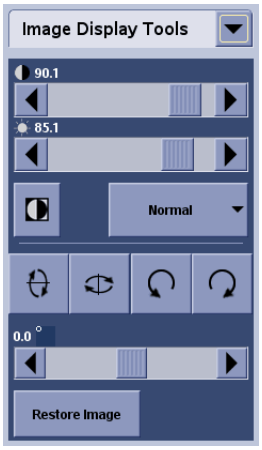

Table 8-3 Image Display Tools descriptions

Tool	Description
Contrast	Adjusts the differences between dark and light on the selected image. • Move the slider right for more contrast (towards pure black and white). • Move the slider left for less contrast (towards uniform gray).
Brightness	Lightens or darkens the selected image. • Move the slider right for a lighter image. • Move the slider left for a darker image.
Invert	Reverses light and dark areas of the selected image.

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Tool	Description
Windowing 	Applies windowing to the selected image. Available options are: • Normal - image as acquired • Hard - adjusts the image towards black and white • Soft - adjusts the image towards gray The GE Digital Detector uses a "Smart Windowing" algorithm to optimize image quality. Smart Windowing is an automated, image-based, and technique-independent method of selecting brightness and contrast for image display. Earlier methods mostly relied on technique information (kVp, dose level, etc.) to set brightness/contrast, making them more prone to operator and system errors.
Vertical Flip 	Flips the selected image 180 degrees on the horizontal axis; that is, switches top for bottom.
Horizontal Flip 	Flips the selected image 180 degrees on the vertical axis; that is, switches left for right.
Rotate Left 	Rotates the selected image counter-clockwise in 90 degree increments.
Rotate Right 	Rotates the selected image clockwise in 90 degree increments.
Free Rotation 	Rotates the selected image both clockwise and counter-clockwise. The range is -180° to 180°. • Press the end buttons to rotate the image in 0.1 degree increments. • Press and drag the slider to spin the image. • Move the slider right to rotate the image clockwise. • Move the slider left to rotate the image counter-clockwise.
Restore Image 	Removes all adjustments and returns the selected image to its original state.

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Annotate and Mask Images

The Annotations/Mask panel (Figure 8-6) contains the tools to annotate images. Table 8-4 describes the tools and their functions.

Image annotations are divided into two categories:

- Image annotation – Lines, ellipses, Cobb angle, user annotation (notes), and RL markers added by the operator to measure or bring attention to a section of the image. You draw or place these annotations on the image as appropriate. Refer to Add Image Annotations (p. 8-13) for more information.
- System annotation – Information that is kept by the system, such as identifying information, exposure and acquisition information, and processing information. These annotations are displayed as text at the corners of the image. You may select which annotations appear, but you cannot control where the annotations are placed.

Figure 8-6 Annotations/Mask panel

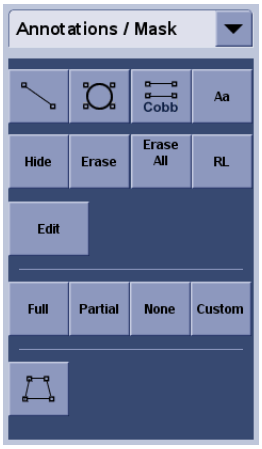
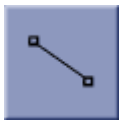
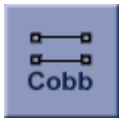


Table 8-4 Annotations/Mask tool descriptions

Tool	Description
Line 	Places a line on the image that you may re-size, move, or angle. Line specifications are shown in the User Measurements annotation at the bottom right corner of the image.
Ellipse	Places an ellipse (circle or oval) on the image that you may re-size, move, or re-shape. Ellipse specifications are shown in the User Measurements annotation at the bottom right corner of the image.
Cobb 	Places a Cobb angle (two lines) on the image that you may re-size, move, or angle. Cobb angle specifications are shown in the User Measurements annotation at the bottom right corner of the image.

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Tool	Description
User Annotation	Places a text box on the image that you may add notes into.
Hide and Show	Temporarily removes image annotations from the image. When annotations are hidden, the button name changes to [SHOW]. Press [SHOW] to see the annotations.
Erase	Deletes the selected image annotation. **NOTE:** Deleted annotations cannot be recovered.
Erase All	Deletes all image annotations. **NOTE:** Deleted annotations cannot be recovered.
RL	Places a Right or Left marker on the image for reference. **NOTE:** RL markers are only available when the image is open in a live exam. Only one marker may be placed on an image.
Edit	Opens a dialog box to edit or change the selected User Annotation (notes).

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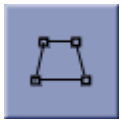
Tool	Description
Full	Places all available system annotation on the image. • Patient information (top left corner) exam date and patient identification • Study information (top left corner) exam identification • Series information (top left corner) series identification • Image information (top left corner) image identification • Acquisition information (top right corner) dose • Hospital information (top right corner) the name of the facility where the image was acquired • X-ray parameters (top right corner) the mA, kVp, ms, mAs, and DEI of the exposure • Anatomy information (bottom left corner) the protocol used to acquire the image • Processing information (bottom left corner) the look used to process the image • User measurements (bottom right corner) size and angle measurements for line, ellipse, and Cobb annotations Display parameters (bottom right corner) the size of the image and the zoom
Partial	Displays ONLY the facility name, dose information and technical factors.
None	Removes all system annotations from the image. System annotations can be re-applied by pressing [FULL], [PARTIAL], or [CUSTOM].
Custom	Brings up a screen (Figure 8-7) that allows you to choose which system annotations appear. Refer to Customize System Annotations (p. 8-12).
Manual Shutter 	Manually adjusts the image shutter. In some cases, the FOV detected by the system does not match the actual exposed FOV. Use the Manual Shutter tool to correct this. **NOTE:** This function is only available when the image is open in a live exam or for re-processed images. Refer to Adjust Image Shutter (Crop Image) (p. 8-15) for more information.

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Customize System Annotations

Follow this process to customize the system annotations that appear on the image.

1. Select the Annotations/Mask panel, if necessary.
2. Press [CUSTOM].
   - The Annotation screen (Figure 8-7) appears.

Figure 8-7 Custom Annotation selections

3. Select (check) the annotations you want to appear.
4. Adjust the Font Size, if necessary.
   - The available font sizes are:
     - -2 (smallest)
     - -1
     - N (normal)
     - +1
     - +2
     - +3 (largest)
5. Press [OK].
   - [CANCEL] closes the screen and leaves the selections unchanged.

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Add Image Annotations

NOTE: All image annotations initially appear in the same place (center of image) and are the same shape, size, and/or angle. It is possible to have multiple annotations of the same kind stacked on top of each other.

Follow this process to add image annotations.

1. Select the image to annotate, if necessary.
2. Press the button of the annotation to insert.

NOTE: Selected image annotations are yellow with red handles. Unselected image annotations are aqua without handles.

3. Move, re-size, or change the angle of the annotation as described in Table 8-5.

NOTE: When resizing annotations, make sure that the pointer arrow is inside the square handle and has changed to a "+" sign (Figure 8-8) before trying to move the handle.

Figure 8-8 Active annotation handle

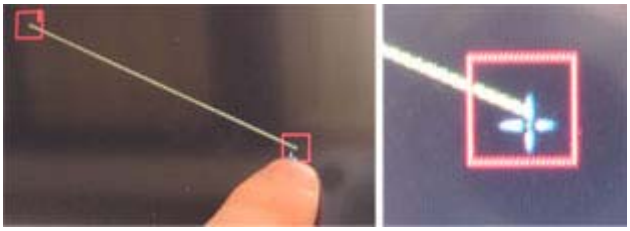
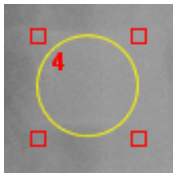


Table 8-5 Image annotation instructions

Tool	Instructions
Line	Select the line. • To move: Press and drag the middle of the line. • To change the angle: Press and drag one of the square handles at the ends of the line. • To resize: Press and drag one of the square handles at the ends of the line.
Ellipse 	Select the ellipse. • To move: Press and drag the ellipse by its edge (not on a handle). • To change shape or re-size: Press and drag a square handle.

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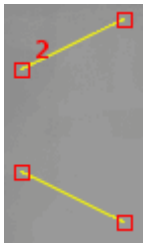
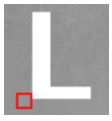
Tool	Instructions
Cobb 	Select the Cobb. • To move: Press and drag the middle of a line. • To change the angle: Press and drag one of the square handles at the ends of the line. • To resize: Press and drag one of the square handles at the ends of the line.
User Annotation	Select User Annotation from the Image Tools palette. Select an annotation from the list or click in the "CUSTOM" text area of the Text Annotation screen. Type your comment. Press [OK]. • To move: Press and drag by the red square on the top left corner of the text box. • To edit: Double-tap (two touches in quick succession) the User Annotation. Make your changes on the Text Annotation screen. Refer to Chapter 10: Set Preferences-Preset Names (p. 10-15) for more information about configuring the pre-set annotation list.
RL Marker 	Select the RL marker. • To move: Select the marker and drag to the desired area. • To switch between R and L: Press the RL button. **NOTE:** Only one RL marker is inserted per image.

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Delete Image Annotations

Follow this process to remove image annotations.

NOTE: It is not possible to recover deleted annotations.

1. Select the annotation.
2. Press [ERASE] or [ERASE ALL].
   - If [ERASE ALL] was pressed, a message appears: "Would you like to remove all annotations from the selected image?"
3. Press [YES].
   - All annotations are removed.

Adjust Image Shutter (Crop Image)

The system has the ability to detect the collimated edges of the image and may apply shutters to mask the collimated areas. Refer to Automatic Shutter (p. 8-16) for more information.

The Manual Shutter function allows you adjust the automatically applied (default) shutter for viewing and printing.

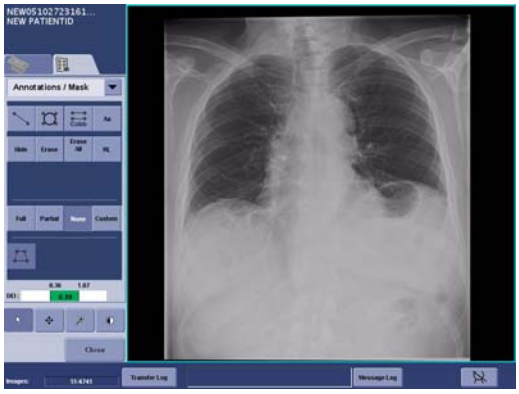
You can only adjust the shutter of images in an active exam or of re-processed images.

NOTE: To view hidden areas of the image, use the Manual Shutter and drag the red corner handles to the edges of the image.

Follow this process to adjust the shutter of an image.

1. Select the image.

Figure 8-9 Image before adjusting shutter



2. Click [MANUAL SHUTTER].
   - The image will be shown in reduced size so that you are able to see the edges (Figure 8-10).
   - The shutter appears as a yellow box with red handles (Figure 8-11). Anything outside of the box will be blacked out when the shutter is applied.

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Figure 8-10 Editing the manual shutter

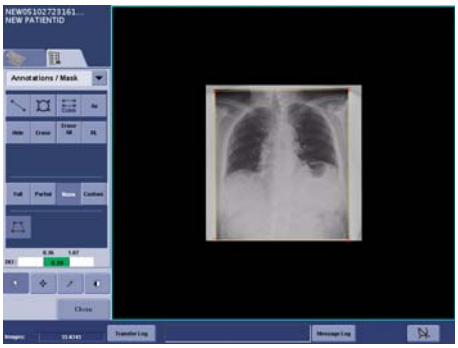
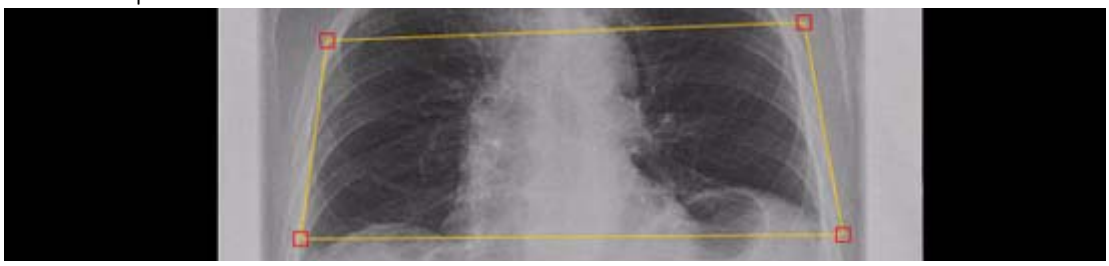


Figure 8-11 Close up of manual shutter



3. Click and drag the red corner handles to the desired shape and size.

NOTE: Any image annotations (line, Cobb, ellipse, R/L marker) that are outside of the visible image area will be lost when the exam is closed. Make sure that annotations are within the active image area. Manual shutters do not effect system annotations.

4. Click [MANUAL SHUTTER] to apply the adjustment.

   - If the image does not return to its selected size, click the Zoom buttons on the Viewer Display panel to re-select the viewing size. Refer to Change Image Display (p. 8-6) for more information.

Figure 8-12 Image after adjusting shutter

5. Click [MANUAL SHUTTER] again to edit.

Automatic Shutter

The Definium 5000 is able to detect collimation edges present in an x-ray radiograph. This allows the system to provide a shuttered image on the viewer.

In the event of incorrect automatic shuttering, the image can be recovered by manually re-shuttering the image to visualize the desired anatomy and then re-processing with the same look.

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Re-process Images

Image re-processing allows the system to extract more information from an already acquired image by changing the processing settings instead of taking additional exposures.

Re-processing can be performed on any image that has a corresponding raw data set. Images can be re-processed both in live exams and in review mode.

Re-processing creates a new image in the "PROCESSED" series.

NOTE: When closing an exam or closing patient in review mode, you must select to save changes to images or the re-processed images will not remain in the series. Refer to Save Changes to Images (p. 8-27) for more information.

The initial image processing is determined by the default that is configured for the protocol. Refer to Chapter 10: Set Preferences-Image Processing (p. 10-32) for more information.

Table 8-6 describes the settings used to re-process an image.

Figure 8-13 Reprocessing panel

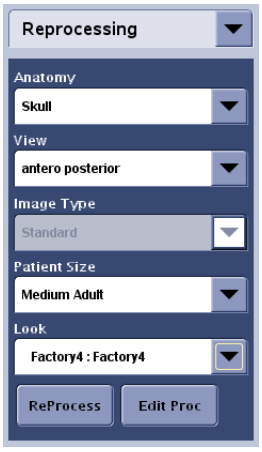

Table 8-6 Reprocessing tool descriptions

Function	Description
Anatomy	Changes the anatomical region.
View	Changes the view.
Image Type	Displays the image type of the acquisition. Images cannot be re-processed with a different image type than originally acquired.
Patient size	Changes the patient size.

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Function	Description
Look	Changes the processing look. Looks are the way an image is processed to be viewed by a radiologist for interpretation. Looks are pre-defined combinations of brightness, contrast, edge enhancement, and tissue equalization. Factory Look descriptions: • Factory Look 1 – similar to analog film, low edge, no TE • Factory Look 2 – low CR look, low edge, moderate tissue contrast • Factory Look 3 – moderate CR look, low edge, TE • Factory Look 4 – highly digital look, high edge, high TE • Custom looks – The system allows you to build up to 5 custom looks in any combination of parameters. Refer to Chapter 10: Set Preferences-Image Processing (p. 10-32) for more information on building custom looks.
[REPROCESS]	Applies the changes and re-processes the image. Re-processing creates a new image in the series. **NOTE:** The button does not become enabled until the Look is selected.
[EDIT PROC]	Brings up a screen that allows you to view the Factory look settings or create custom looks. Refer to Chapter 10: Set Preferences-Image Processing (p. 10-32) for more information about building custom looks.

Determine if Images should be Retaken (DEI)

The Detector Exposure Index (DEI) provides a visual indicator to the user for the amount of exposure received by the detector for a given image. It is designed as a tool for the user to be able to obtain a properly exposed image by altering acquisition parameters in the event of a retake. DEI estimates the dose that has reached the detector and compares it to the expected dose for the anatomy to indicate if the image is under- or over-exposed.

With film cassettes, exposure is directly related to the resulting image; films that are under-exposed or over-exposed will be either too light or too dark. With the DR Detector, dynamic range detection algorithms compensate for exposure errors to create images with acceptable brightness and contrast. Because there is no visible relationship between the actual exposure and the image quality, DEI is used to identify and track under- and over-exposure.

The DEI acceptable range varies by anatomy. For example, a chest PA exposure may result in a DEI of 0.6 while a hand exposure may result in a DEI value of 1.0.

The display of the Detector Exposure Index and the DEI ranges are configured from the Image Viewer preferences screen. Refer to Chapter 10: Set Preferences-DEI (Detector Exposure Index) (p. 10-29) for more information.

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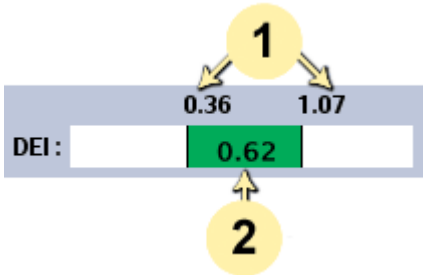
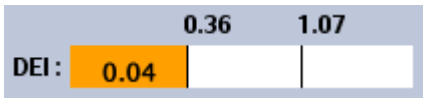
Figure 8-14 DEI graphical display



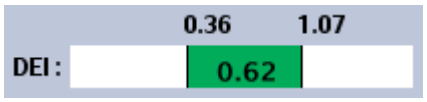
1. Acceptable DEI range (upper and lower limit)
2. Current DEI for the selected image

Figure 8-15 Examples of graphical DEI displays



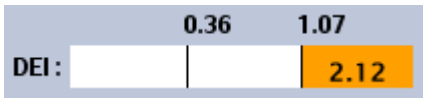
First segment (left) colored orange

Low DEI = Image under-exposed



Center segment colored green

Acceptable DEI = Image correctly exposed



Last segment (right) colored orange

High DEI = Image over-exposed

For each acquired image, the system provides 3 estimated values:

- Uncompensated Detector Exposure (UDExp): Estimated exposure (µGy) to the detector behind the patient anatomy with an assumed technique of 80 kV with no anti-scatter grid. This information is stored in the DICOM header.
- Compensated Detector Exposure (CDExp): Estimated exposure (µGy) to the detector behind the patient anatomy with the actual kV and use of anti-scatter grid. This information is stored in the DICOM header.
- Detector Exposure Index (DEI): A relative measure of exposure to the detector, as compared to the expected exposure for a particular anatomical view. It is a visual indicator on the viewer display.

DEI compensates for the speed setting of the system. For example, if an exposure is taken of an object at a speed setting of 400 and the resultant DEI was 1.72, then an exposure taken of the same object (assuming identical technique and positioning) after setting the speed to 200 will also give a DEI of 1.72.

NOTE: A higher DEI indicates a higher exposure to the detector. It should not be confused with system "speed" which decreases as the exposure increases.

Default DEI lower and upper limits are provided as preliminary guidelines. These guidelines should not be taken as strict requirements of retakes/re-exposures. DEI read-outs are reference guides to help the technologist determine that if a re-acquisition of an image is necessary, the indicator can help the user determine appropriate technique adjustments to provide adequate exposure to the detector.

The specific limits and retake rules should be ultimately determined by the appropriate staff at your facility.

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Corrective Actions

Do the following if both the DEI value is outside of the acceptable range and the image quality is poor:

- Low DEI - increase the mAs and kV values. Increase mAs by increments of 2 Renard steps and check that kVp range is anatomically appropriate.
- High DEI - decrease the mAs and kV values. Decrease mAs by increments of 2 Renard steps and check that kVp range is anatomically appropriate.

NOTE: A 2-Renard step adjustment is equivalent to a 25% change. The amount of change will depend on how high or low the DEI reading is. If the DEI is twice the recommended range, then the initial adjustment should be to cut the mAs in half in order to create a noticeable change in the mAs delivered to the detector and thus change in the DEI readout in subsequent exposures.

If DEI is within the acceptable range but the image quality is still poor, the image may need adjustment through looks customization. Refer to Re-process Images (p. 8-17) to correct individual images or Chapter 10: Set Preferences-Image Processing (p. 10-32) to change the default processing for exams and views.

NOTE: Call for service if the system continues to show low or high DEI. Recurring DEI errors may indicate that the system needs calibration or repair.

Exceptions to Corrective Actions

The following conditions may achieve a properly exposed image but still result in a low DEI. These should be treated as special cases and the standard retake and corrective action rules may not apply.

- The presence of external patient shielding (i.e., lead apron) in the field of view can result in an unexpectedly low DEI (and UDExp/CDExp). The presence of shielding can be easily confirmed by viewing the image.
- The incorrect determination of the FOV by the system can result in an unexpectedly low DEI (and UDExp/CDExp). The presence of significant collimation regions in the final image can be easily confirmed by viewing the image. Correcting the FOV using the Manual Shutter feature does NOT correct the DEI value.

NOTE: User must select the appropriate FOV for the anatomy imaged, and use proper collimation at all times.

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Change Pointer Controls

The pointer control buttons (Figure 8-16) change the action of the pointer when it is pressed and dragged on an image.

Figure 8-16 Pointer control buttons

The pointer controls allow you to perform other functions that are not available in any other tool panel.

Follow this process to change the pointer controls. Table 8-7 describes the action of each control.

1. Select the image to act upon, if necessary.
2. Press the pointer control to use.
3. Press and drag the pointer on the selected image.

Table 8-7 Pointer Controls description

Tool	Description
Select Image	When viewing multiple images, selects the image to act upon. This is the default pointer behavior.
Pan Image	Moves the image within the viewing area.
Image Magnifying Glass	Shows a small part of the image at 3 times magnification.
Change Image Brightness / Contrast	Changes the brightness and contrast by dragging the pointer instead of using the Image Display Tools controls. • Contrast: Press and drag the pointer vertically. Up is more contrast, down is less contrast. • Brightness: Press and drag the pointer horizontally. Right is brighter, left is darker Moving the pointer diagonally will change both brightness and contrast in proportion to the angle of movement. That is, if you move the pointer at a perfect 45° angle, brightness and contrast will change equally; however, if you move the pointer at a 20° angle (more horizontally) the brightness will change more than the contrast.

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Apply Quality Check Indicator (Auto Tag)

If Auto Tag is enabled, the quality check symbol indicates that an image is of acceptable quality and allows the image to be auto printed and auto pushed (if enabled). Refer to Chapter 10: Set Preferences-Auto Tag (Quality Check) (p. 10-19) to enable Auto Tag.

The quality check indicator is a "T" that appears in a white box at the bottom right corner of the image (Figure 8-17). The quality check indicator is on by default. Removing the indicator means that the image is not acceptable and will not be auto printed or auto pushed and will remain on the local database only.

NOTE: The quality check indicator is only available in live exams.

- To remove the quality check indicator, press the white box so that the "T" disappears.
- To restore the quality check indicator, press the white box so that the "T" reappears.

Figure 8-17 Quality check indicator

Print Images

Images can be printed from the system in two ways: Manual Print and Auto Print.

Auto Print

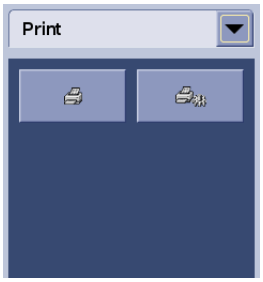
The system can be configured to perform an automatic print upon closure of the exam. Preferences are accessed from the Utilities screen. Refer to Chapter 10: Set Preferences-Auto Print (p. 10-19) for information on configuring Auto Print.

Manual Print

Film Manager and Manual Print allow you to print images on demand.

- Film Manager allows configuration and printing of multiple images in a series.
- Manual Print allows configuration and printing of the currently selected image.

Figure 8-18 Print panel



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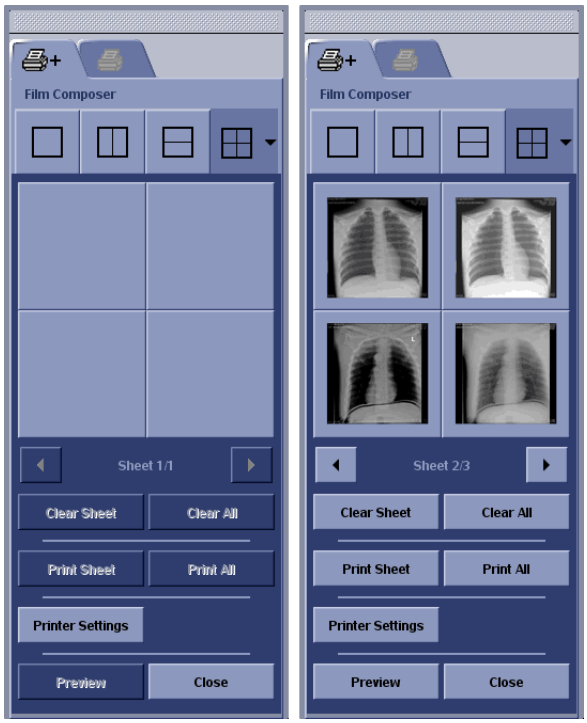
Print Multiple Images

Follow this process to print multiple images.

1. Press [FILM MANGER].
   - The Film Composer screen (Figure 8-19) appears.

Figure 8-19 Film Composer screen - before and after images are added

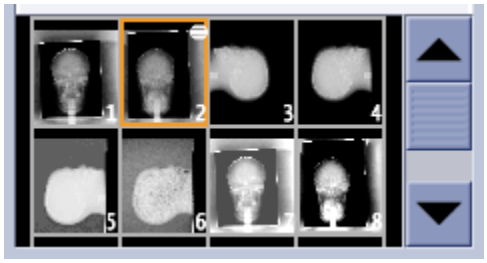


2. Select the number of images you want to appear on a sheet.
   - If there are more images in the series than will fit on the sheet, use the Sheet [◂] and [▸] buttons to configure the printing options for each sheet.

NOTE: You are able to change the number of images for each sheet individually; however, changing the format will remove any images that already exist on the sheet.

3. Drag the image thumbnails from the Images - Raw or Images - Processed panel (Figure 8-20) to the Film Composer screen.

Figure 8-20 Images - Processed panel



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4. Use the buttons to confirm and adjust the print settings.
   - Press [PREVIEW] to see how the images are positioned on the sheet.
   - Press [CLEAR SHEET] to remove images from the currently displayed sheet.
   - Press [CLEAR ALL] to remove images from all sheets.
   - Press [PRINT SHEET] to print the currently displayed sheet.
   - Press [PRINT ALL] to print all sheets.
5. Press [PRINTER SETTINGS] to confirm or adjust the printer configuration. (Refer to Figure 8-22 and Table 8-8 for more information.)
6. Press [CLOSE] when finished.

Print Current Image

Follow this process to print a single image.

1. Select the image from the Images tool palette, if necessary.
2. Press [MANUAL PRINT].
   - The Print Images screen appears.
3. Adjust the settings as indicated in Table 8-8.
4. Press [PREVIEW] to confirm that the image placement is correct.
   - If the image placement is incorrect (as shown in Figure 8-21), press [CANCEL] to return to the Print Images screen and adjust the settings.
   - If the image placement is acceptable, press [PRINT] to print the image.

Figure 8-21 Example of Print Preview with incorrect settings

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5. Press [PRINT] to print the image.
   - [CANCEL] closes the Print Images screen without printing and returns you to the Image Viewer screen.

Figure 8-22 Print Images screen

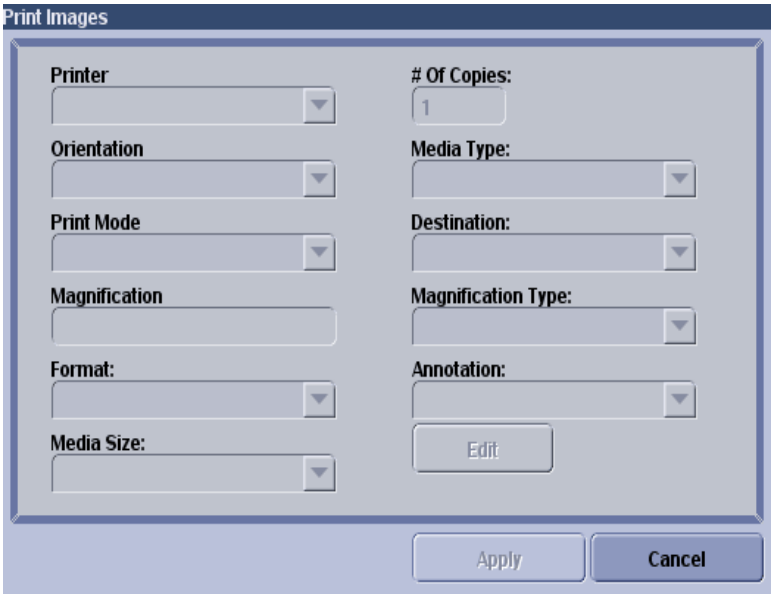

Table 8-8 Print Images field description

Field	Description
Printer	Lists all available printers configured for your system.
Orientation	Selects vertical or horizontal orientation of the image on film or paper. Available options are: • Landscape • Portrait
Print Mode	Selects what size to print the image. Available options are: • True Size • Fit to Film • Reduce Size • Orthopedic Magnification (if enabled)
Magnification	If Reduce Size is selected as the Print Mode, allows you to enter the percent by which the image will be reduced. The accepted range is between 40% and 90%. If True Size or Fit to Film are selected as the Print Mode, the text box remains disabled.

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Field	Description
Format	Selects the print format. Available options are: • Standard • 35 mm • 40 mm
Media Size	Shows the available sizes that are configured for the selected printer.
# of Copies	Defines how many copies to print.
Media Type	Selects the type of media to print on. Available options are: • Paper • Clear film • Blue film
Destination	Selects the destination. Available options are: • Processor • Magazine
Magnification Type	Selects the magnification type. Available options are: • Cubic • None
Annotation	Selects the amount of annotation to print on the image. Available options are: • Full • Partial • Custom • None Refer to Annotate and Mask Images (p. 8-9) for more information.
[EDIT]	If Custom Annotation was selected, brings up a screen that allows you to choose the annotation to print on the image. Refer to Annotate and Mask Images (p. 8-9) for more information.
[PREVIEW]	Shows how the image will appear on the film or paper with the current settings.
[PRINT]	Prints the image.
[CANCEL]	Cancels printing.

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Orthopedic Magnification

Orthopedic Magnification is an option that allows you to introduce a fixed amount of magnification percentage so that the image size will match previously calibrated orthopedic templates.

This section provides instruction on printing images with Orthopedic Magnification.

NOTE: The functions described in this section are only available if Orthopedic Magnification is enabled. GE Service personnel enable Orthopedic Magnification and enter the Configurable Magnification Factor (CMF) through the Services User Interface. The CMF is the amount of magnification applied to all Orthopedic Magnification functions. Only GE Service personnel are able to change the CMF.

Only processed images will have Orthopedic Magnification applied. The raw images remain as acquired.

Send Images

If Auto Send is enabled, acquired images are automatically sent to a pre-determined location on exam close. Refer to Chapter 10: Set Preferences-Auto Send (Auto Push) (p. 10-22) for information on configuring Auto Send.

Save Changes to Images

You have the option to save or discard the changes you have made to images when you close the Image Viewer screen or end the exam.

1. If in a live exam, press [CLOSE] on the Acquisition screen.
2. If in review mode, press [CLOSE] on the Image Viewer screen.
   - A message appears: “Would you like to save the changes made to the images?”
3. Press [YES].
   - [NO] closes the Image Viewer screen without saving changes.

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Chapter 9: Image Management

The Image Management screen (Figure 9-1) shows all the images stored in the selected database source. This screen is used to manage images, copy images to exams, transfer images to network hosts, or save images on CD.

Topics covered include:

- Overview (p. 9-1)
- View Patient Information (p. 9-6)
- Load Images from a CD (p. 9-6)
- Search List (p. 9-7)
- Open Exams and Images (p. 9-8)
- Copy Exams and Images (p. 9-8)
  - Copy Exams to a Network Host (p. 9-8)
  - Copy Images to Another Exam (p. 9-9)
  - Copy Exams to a CD (p. 9-11)
- Delete Exams, Series, or Images (p. 9-12)
  - Lock Exams from Deletion (p. 9-13)
- Make Exam Anonymous (De-Identify) (p. 9-13)

Overview

The majority of the Image Management screen is devoted to the exam list. Images are organized by exam. Each exam is a row. If multiple exams were acquired in the same session, each exam has its own row on the list. The exam expands to show the series.

Within each exam are “series” of images. A series is a collection of one or more images acquired in a session. Each protocol is a series. A new series is created when a completed exam is appended.

There are two types of image series: raw and processed. Raw images are the exact images that were acquired. Processed images are the raw images with specific processing and image adjustments (such as brightness and contrast) applied. It is possible to create several processed images from one raw image.

Individual images reside within the series. Pressing a series or pressing the [+] button opens the image details section of the Image Management screen. In the Image Details section, each row is an image. Selecting a row makes a small preview image, or “thumbnail,” appear. The image may be opened for viewing, adjustment, or deletion.

Selecting multiple exams on the Image Management screen is different than on the Worklist. The Image Management screen allows you to select exams that do not have the same Patient ID or Patient Name. To select multiple exams, press the [SELECT MULTIPLE] button, then select the exams. The [SELECT MULTIPLE] button will remain engaged until an action (such as Copy Exam or Transfer) is completed, then the button will automatically disengage.

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Figure 9-1 Image Management screen

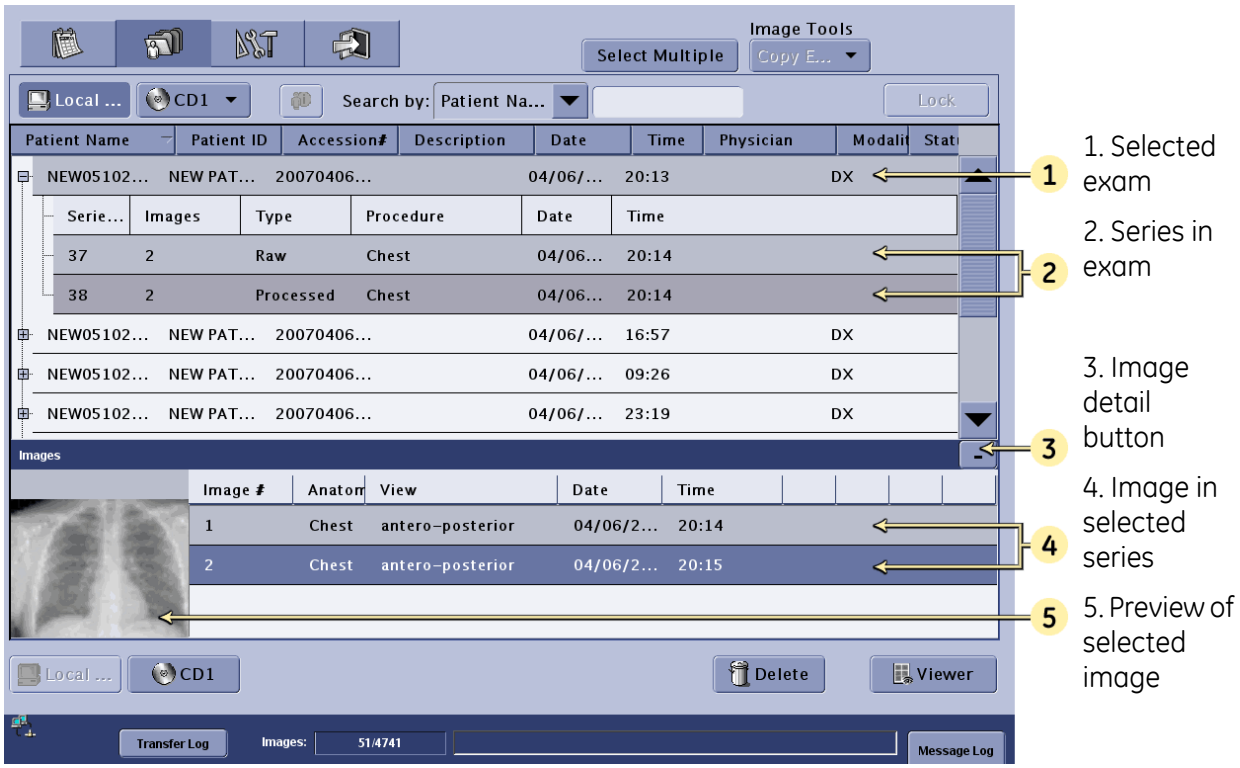

Table 9-1 Image Management screen functions

Function	Description
navigation bar	Allows you to change between the Worklist, Image Management, and Utilities screens or allows you to logoff the system (if applicable). The darker color indicates which screen is currently displayed. The individual buttons are described below.
[WORKLIST]	Opens the Worklist screen where patient procedures may be added to the schedule and exams started. Refer to Chapter 5: Worklist for more information.
[IMAGE MANAGEMENT]	Opens the Image Management screen where images may be selected for viewing or be copied to other exams.

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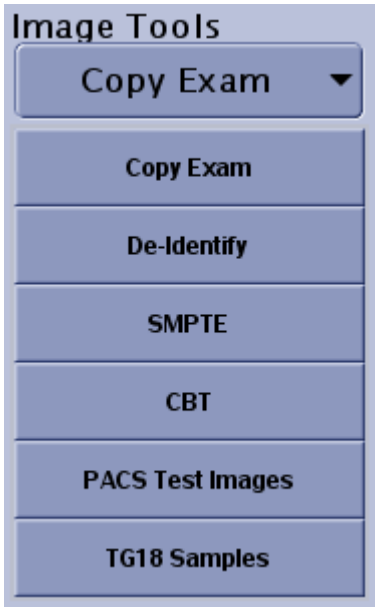
Function	Description
[UTILITIES] 	Opens a screen where system settings (such as Network and Printer connections) and preferences may be changed. If the Login function is enabled, the preferences you are allowed to change will vary depending on your level of access. Refer to Chapter 10: Set Preferences for more information.
[LOG OFF] 	If the Login function is enabled, pressing this button logs the current user off of the system. Refer to Chapter 4: General Information-Login and Log off (p. 4-3) for more information.
[SELECT MULTIPLE] 	Allows systems with touch screens to select multiple exams to transfer, copy to CD, or delete. **NOTE:** This button only allows the selection of multiple exams and images, not series. **CAUTION:** **If both exam and images are selected, the exam will be deleted upon confirmation.**
Image Tools 	Performs various functions on selected exams. Available options are: • Copy Exam – Allows all exam images for a patient to be copied to another patient, to another location, or to CD. Refer to Copy Exams and Images (p. 9-8) for more information. • De-identify – Makes the exam anonymous (removes all patient identifying information, including Name, ID, and accession number). Refer to Make Exam Anonymous (De-Identify) (p. 9-13) for more information. • SMPTE – Allows services personnel to access the SMPTE pattern for system calibration. • CBT – If available, launches Computer Based Training for the system. If Computer Based Training is not available, the option is disabled ("grayed out"). • PACS Test Images – Loads a set of calibration images that are used to test the quality of images sent to PACS or printers. • TG18 Samples – Loads a set of test images that are used to calibrate the display monitor. **NOTE:** It is not expected that you will need to access the SMPTE pattern or test images during the course of normal work. Test images are used to calibrate the system or to determine the cause of image quality problems.

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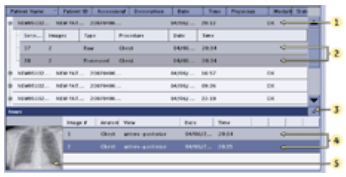
Function	Description
source locations	Selects the source of images to view (e.g., the local unit or a CD). Refer to Open Exams and Images (p. 9-8) for more information.
[PATIENT INFORMATION]	Shows the Patient Information screen for the selected procedure. **NOTE:** Patient Information cannot be edited once an exam has started. Refer to Chapter 5: Worklist-Add / Edit Patient Information (p. 5-15) for more information.
Search by	Searches for exams by sorting the selected the column (shown in the drop-down list) and searches for text entered into the text box. Refer to Search List (p. 9-7) for more information.
[LOCK] or [UNLOCK]	Locks the selected exams from deletion. If a locked exam is selected, the button name changes to [UNLOCK]. [UNLOCK] removes the lock from the selected exams. Refer to Lock Exams from Deletion (p. 9-13) for more information.
Exam, series, and images list 	Lists the images saved in the local database categorized by exams and series. The following information is displayed: • Exams - the exams saved in the local database • Series detail - the series for the selected exam • Image list - the images for the selected series • Image preview - a representative thumbnail of the selected image. Figure 9-1 shows how the information is organized.
Destination	Selects where images are to be copied or saved. The first button switches between the local unit and any configured network hosts. Refer to Copy Exams and Images (p. 9-8) for more information.
[DELETE]	Deletes the selected exams, series, or images from the local database. Refer to Delete Exams, Series, or Images (p. 9-12) for more information.
[VIEWER]	Opens the Image Viewer screen and shows the images in the selected series. Images may be adjusted on the Image Viewer screen. Refer to Chapter 8: Image Viewer for more information.

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Function	Description
network connection status	Appears when the Definium 5000is connected to the hospital network.
[TRANSFER LOG]	Shows a list of transferred exams and their destinations. Refer to Copy Exams and Images (p. 9-8) for more information.
database size	Shows how many images are currently saved to the local database and approximately how many more images the database is able to accommodate. Refer to the following sections for more information: • Copy Exams and Images (p. 9-8) to save images to another database or disk • Delete Exams, Series, or Images (p. 9-12) to remove images
system status	Displays the last system status message. Refer to Chapter 4: General Information-System Status and Messages (p. 4-7) for more information.
[MESSAGE LOG]	Displays the message log since the last system re-start. Refer to Chapter 4: General Information-System Status and Messages (p. 4-7) for more information.
[iLinq]	Connects to iLinq remote support services. Refer to Chapter 4: General Information-iLinq (p. 4-9) for more information.

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View Patient Information

When accessed from the Image Management screen, the Patient Information screen displays exam information about the acquired images in the lower left corner (Figure 9-2). All other patient information is as described in Chapter 5: Worklist-Add / Edit Patient Information (p. 5-15).

Figure 9-2 Patient Information from Image Management screen

Load Images from a CD

Follow this process to access images stored on a CD.

1. Insert the CD with images into the CD drive.
2. Press Source [CD1].
   - The exam list updates to show the images stored on the CD.
3. Select the exams.
4. Copy the exams to the Local database. Refer to Copy Exams and Images (p. 9-8) for more information.
5. Click the [LOCAL] Destination button.
   - A message appears: "Selected images will be copied to (destination name). Select OK to confirm."
6. Click [OK].
7. Open the exams from the Local database.

NOTE: If the exams are being viewed on a computer that has the DICOM viewer installed, images may be viewed directly from the CD.

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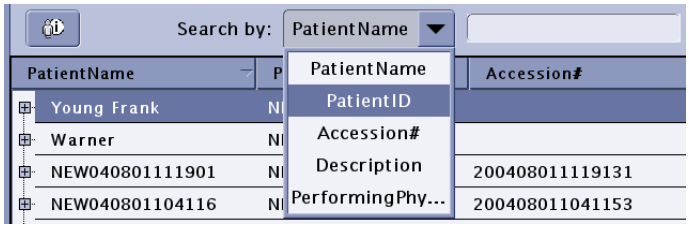
Search List

The Search feature finds procedures by column.

Figure 9-3 Search by column drop-down list



1. Press the button on the Search By drop-down list to select the column you want to search.
   - If the column you want is already selected, begin at step 3.
2. Select the column. For example, Patient ID.
   - The list automatically sorts the selected column.
3. Type the search criteria into the text box. For example, you are looking for patients whose names begin with "J", so you would type "j" into the text box.

NOTE: The text box is not case sensitive.

4. Continue typing the search criteria.
   - The list automatically selects the first procedure that matches what you have typed into the text box.
   - If no procedures match what you have typed, the list de-selects all procedures and places the closest match at the top of the exam list.

Sort by Column

Sorting allows you to organize the procedures by the column of your choice.

1. Press on the column heading you want to sort, or choose the column in the Search By drop-down list. For example, you want to see all the procedures that were performed by a specific physician, so you click on the "Performing Physician" column heading.
   - An arrow appears in the column heading to indicate which column is currently being sorted.
2. Press the column heading again to switch between ascending and descending order.
   - An up-pointing arrow indicates that the column is sorted in ascending order. That is, sorted in alphabetical order or numerical order from smallest to largest.
   - A down-pointing arrow indicates that the column is sorted in descending order. That is, sorted in reverse alphabetical order or numerical order from largest to smallest.

Figure 9-4 Column with ascending sort

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Open Exams and Images

Follow this process to open exams and images for viewing.

1. Press the [+] button to the left of the exam name to open it.
   - The series for the exam expands below the exam.
2. Press the series to open it (or, select the series and press [+] to see image details).
   - The image detail opens.
3. Select the image.
   - A preview thumbnail appears.
4. Press the image (or, select the image and press [VIEWER]).
   - The selected series opens on the Image Viewer screen with the selected image displayed.

Copy Exams and Images

Exams (including all series and images) may be copied to a network host or to a CD. The images from one exam may be copied to another exam.

NOTE: Copying exams does not remove the exam from its original location.

Copy Exams to a Network Host

Exams may be copied from the local database to a configured network location or vice versa. Exams cannot be copied from one network host to another network host. Refer to Chapter 10: Set Preferences for information about configuring network hosts.

1. Select the exams to copy.
2. Press [DESTINATION].
   - A message appears: “Images will be copied to (host name). Select OK to confirm.”
3. Press [OK].
   - If there is a problem and the exams cannot be copied to the selected network host, a message appears: “The network destination is not responding. If the problem persists contact your network administrator.”
4. Press OK to close the message. Make sure that the unit is properly connected to the network or try copying the exams at a later time.
   - To see the status of the exams being copied, press [TRANSFER LOG] at the bottom of the Image Management screen.
   - The Transfer Log screen (Figure 9-5) appears.
5. Press [CLOSE] to close the screen and return to the Image Management screen.

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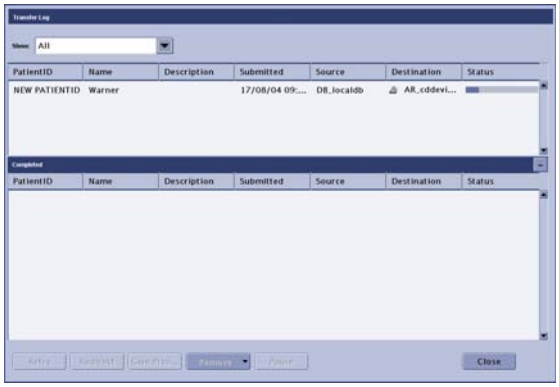
Figure 9-5 Transfer Log screen



Copy Images to Another Exam

This process is used to copy images from one exam to another. Copying images is used to consolidate images from multiple exams to a single exam and to reconcile patients to exams. For example, images taken for an emergency exam can be assigned to the patient's real name once the patient's information is known. Another example is to assign images that were acquired for the wrong Worklist entry to the correct patient.

Images are copied to procedures that appear on the Worklist. Once the copy is complete, the procedure is marked as "Completed" on the Worklist and the new exam appears on the Image Management screen. Images may be copied to procedures with the status of Suspended, Discontinued, or Scheduled. Images may not be copied to procedures with a status of Completed.

NOTE: You can only copy the images from one exam at a time.

NOTE: You cannot copy images to multiple Worklist procedures.

1. If necessary, create a Worklist procedure entry for the patient with the appropriate information.
   a) On the Worklist screen, click [ADD PATIENT].
   b) Enter the patient's information. Refer to Chapter 5: Worklist-Add / Edit Patient Information (p. 5-15) for more information.
   c) Click [SAVE].
2. On the Image Management screen, select the exam to copy.

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3. Switch the [IMAGE TOOLS] button to COPY EXAM, if necessary.
   - The Copy Exam screen appears.

Copy Exam
Select an exam on the worklist to receive the copied images from the benton peter – exam
Search by:
Status
Filter List
Refresh List
Date
Time
Patient Name
Patient ID
Accession#
Physician
Description
Modality
Status
08/02/2005 14:10 coruday, elizabeth NEW PATI... DX SCHEDUL...
08/02/2005 14:09 ross, douglas NEW PATI... DX COMPLE...
08/02/2005 14:09 ross, doug NEW PATI... DX SCHEDUL...
08/02/2005 14:09 romano, robert NEW PATI... DX SCHEDUL...
08/02/2005 14:07 tracey, harper NEW PATI... DX SCHEDUL...
08/02/2005 14:07 greene, mark NEW PATI... DX COMPLE...
08/02/2005 14:06 susan, lewis NEW PATI... DX COMPLE...
08/02/2005 14:06 kerry, weaver NEW PATI... DX SCHEDUL...
08/02/2005 14:06 hathaway, carol NEW PATI... DX SCHEDUL...
08/02/2005 14:05 carter, john NEW PATI... DX SCHEDUL...
08/02/2005 14:05 benton, peter NEW PATI... DX COMPLE...
08/02/2005 14:05 benton, peter NEW PATI... DX SCHEDUL...
OK
Cancel

   - The Copy Exam screen shows all Worklist entries with the status of “Scheduled”, “Discontinued”, or “Suspended”.
4. Search or Filter the exam list to locate the destination exam.
5. Select the exam where you want the images copied to.
6. Press [OK].
   - A message appears: “Images will be copied to the selected exam. Images will not automatically be removed from the source exam. The destination exam will be marked as Completed.”
7. Click [OK].
   - The message closes.
   - A message appears: “Copying Images”
   - [CANCEL] stops the copy process, closes the message, and returns you to the Image Management screen.
   - All series and images are copied to the exam.

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Copy Exams to a CD

Exams may be copied to a CD for archiving purposes, to send to a location that is not within the network, or to include with a patient's medical records.

NOTE: The CDs used for copying images must be recordable. That is, the CD should be labeled "CD-R" (recordable).

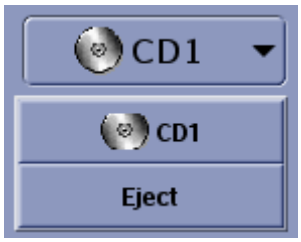
DO NOT use re-writable (CD-RW) disks. The system cannot write to this type of disk.

NOTE: You cannot copy exams to a CD that already has exams or other information saved on it. You will receive a message, "CD is not blank. Please insert a blank CD to proceed" when you attempt to copy images to the CD. Always use a new, blank CD.

1. Open the CD tray. (Select Eject from the [CD1] drop-down list.)

NOTE: Pressing the Eject button on the workstation PC does not open the CD tray. When working on the Image Management screen, always use the Eject option from the [CD1] drop-down list (Figure 9-6).

Figure 9-6 CD 1 button drop down list



2. Insert a blank CD into the tray.
3. Press Source [CD1] to close the CD tray.
4. Select the exams to copy.
5. Click the **Destination** [CD1].
   - The CD Write screen appears.

   - [DESELECT ALL] unchecks all exams on the list.
   - [STORE OPTIMALLY] determines which exams to copy to best utilize the space on the CD. It will automatically uncheck exams that cannot fit on the CD.
   - [WRITE] begins the copying process.
   - [CANCEL] closes the screen and returns you to the Image Management screen.

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6. Confirm the exams to be copied. Uncheck any exams that you do not want saved to the CD.
7. Press [WRITE].
   - The CD begins copying. The light on the front of the computer flashes yellow as the data is being written.
   - To see the status of the exams being copied, press [TRANSFER LOG] at the bottom of the Image Management screen.
   - The Transfer Log screen appears.
   - Press [CLOSE] to close the screen and return to the Image Management screen.
   - When complete, the CD tray will open and close.
8. After the system finishes the CD, open the exams on the CD to ensure that the CD has the data written to it. Refer to Load Images from a CD (p. 9-6) for more information.
9. Remove the CD.
10. Label the CD and store in a safe place.

Delete Exams, Series, or Images

Exams, series, and images may be deleted from the local database from the Image Management screen.

Follow this process to delete exams, series, and images.

1. Select the **Local** source, if necessary.

NOTE: Items cannot be deleted from a CD or network locations.

2. Unlock exams, if necessary.
   - Refer to Lock Exams from Deletion (p. 9-13) for more information.
3. Select the items to delete.
   - The items may be exams, series with an exam, or images within a series. Multiple items may be selected and deleted at once.
4. Press [DELETE].
   - A message appears: “Are you sure that you would like to delete the selected items?”
5. Press [OK].
   - The message closes.
   - The items are deleted from the Image Management screen.
   - [CANCEL] closes the message and the items remain on the Image Management screen.

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Lock Exams from Deletion

The Image Management screen allows you to prevent, or "lock", exams from being deleted. The exam can only be deleted if the lock is removed, or "unlocked." The lock prevents exams from being deleted by other operators and from Auto Delete. Refer to Chapter 10: Set Preferences-Image Management (p. 10-18) for more information about Auto Delete.

Locked exams can still be copied, transferred, and viewed.

Only exams can be locked. Individual series or images cannot be locked.

Follow this process to lock and unlock exams.

1. Select the exams to lock.
   - Multiple exams may be selected and locked at once.
2. Press [LOCK].
   - The lock icon appears in the status column of all selected exams.

   - The [LOCK] button changes to [UNLOCK].

Unlock Exams

Follow this process to unlock exams so that they may be deleted.

1. Select the locked exams.
   - The Unlock button becomes active.
2. Press [UNLOCK].
   - The lock icon is removed from the status column of the selected exams.
   - The exams may now be deleted.

NOTE: You are able to lock or unlock multiple exams even if the selected exams are a mixture of locked and unlocked. Pressing the [LOCK] button will lock all selected exams. Clicking the button again will unlock all selected exams.

Make Exam Anonymous (De-Identify)

There may be times when you want the name of a patient to be kept confidential to maintain patient privacy. You can do this using the De-Identify feature. This feature allows you to create an anonymous set of images.

The patient examinations are copied and used to create a new patient, with the name "Anonymized patient" and a unique, randomly created Patient ID as shown in Figure 9-8.

NOTE: The original exam is not modified in any way, only a copy is altered.

NOTE: Once an anonymous exam is created, there is no way to recover the patient's identifying information.

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The De-Identify option is available from the Image Tools button (Figure 9-7).

Figure 9-7 Image Tools button

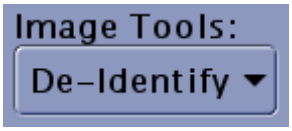
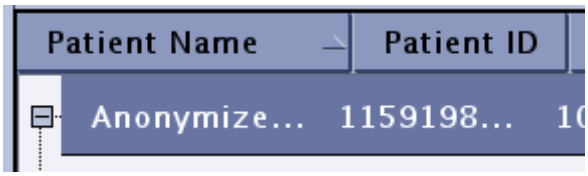


Figure 9-8 Anonymous patient



Use this process to make exam images anonymous:

1. Select the exams to make anonymous.
2. Switch the Image Tools button to [DE-IDENTIFY], if necessary.
   - A message appears: "The selected exams will be copied without patient identification. The originals will not be deleted."
3. Press [OK].
   - The Image Management screen updates with copied, anonymous exams.

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Chapter 10: Set Preferences

Preferences allow a super-user to customize the system. This chapter explains the Preferences available to you and how to activate or change the preferences for your facility, such as:

- Predefine X-ray procedure parameters so that any stored procedure may be retrieved from memory, allowing you to access technique factors programmed for that type of procedure.
- Enable automatic networking and printing features.
- Customize system default annotations and image orientation.
- Create preferences for image processing.
- Save commonly used operator and physician names in your system for later recall.

Topics covered include:

- System (p. 10-2)
  - Network Connections (p. 10-2)
  - Printers (p. 10-7)
- Worklist (p. 10-13)
  - Default Query (p. 10-13)
  - Preset Names (p. 10-15)
- Image Management (p. 10-18)
  - Copy Exam (p. 10-18)
  - Auto Tag (Quality Check) (p. 10-19)
  - Auto Print (p. 10-19)
  - Auto Send (Auto Push) (p. 10-22)
  - Auto Delete (p. 10-23)
- Image Viewer (p. 10-26)
  - Configure Pre-set Annotations (p. 10-26)
- DEI (Detector Exposure Index) (p. 10-29)
- Exam (p. 10-31)
- Image Processing (p. 10-32)
  - Build Custom Looks (p. 10-33)
  - Tissue Equalization Overview (p. 10-37)
- Protocols (p. 10-40)
  - Backup Protocol Database to CD (p. 10-41)
  - Retrieve Protocol Database from CD (p. 10-42)
  - Edit Protocol Database (p. 10-42)
  - Protocol Editor Copy Functions (p. 10-50)

Preferences are set on the Utilities screen (Figure 10-1), which is accessed by pressing the [UTILITIES] button on the Worklist.

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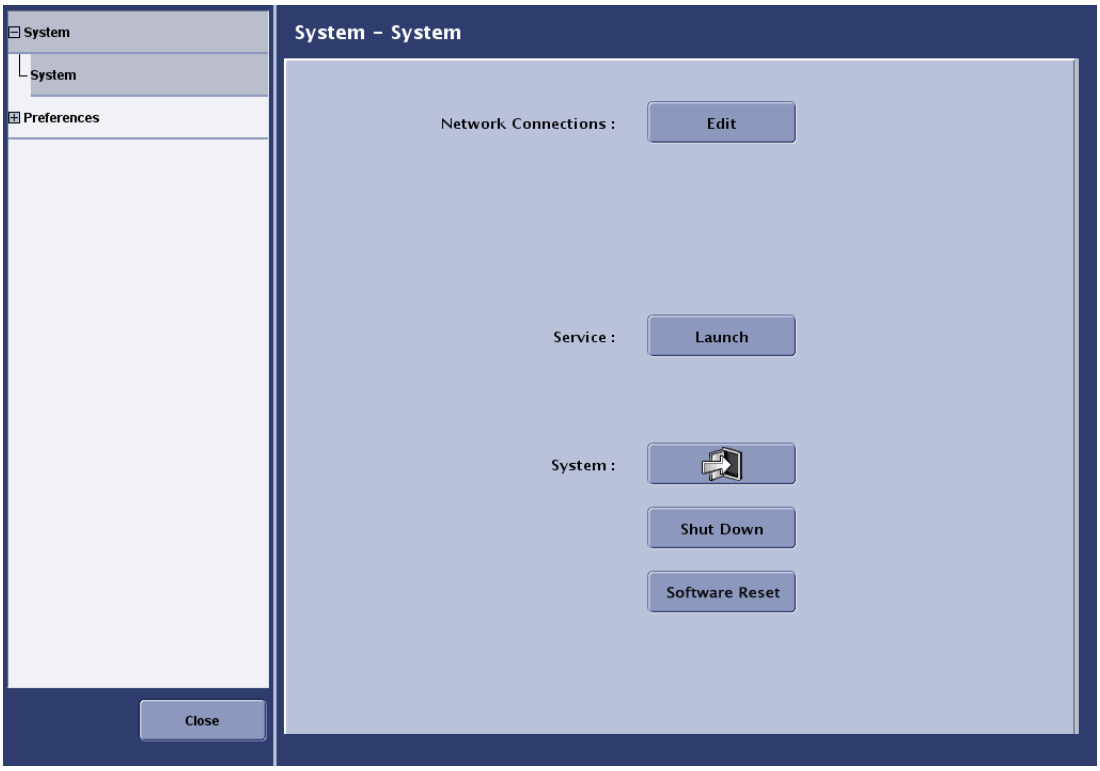
Figure 10-1 System Utilities screen



System

This section provides instructions for setting your system preferences for network and printer connections. The Services Desktop, Log Off, and Shut Down functions are also available from this screen. Refer to Chapter 4: General Information for more information about logging off and Shut Down.

Network Connections

Network and printer connections are configured through the Utilities System-System screen. This screen allows qualified service personnel to define the Digital Imaging and COmmunication in Medicine (DICOM) send destinations.

Network connections may be added, removed, or edited from this screen.

Follow this process to access the Network Connections screen.

1. On the Worklist screen, press [UTILITIES].
   - The System-System screen appears.
2. Press [NETWORK CONNECTIONS].
   - The Network Connections screen (Figure 10-2) appears.

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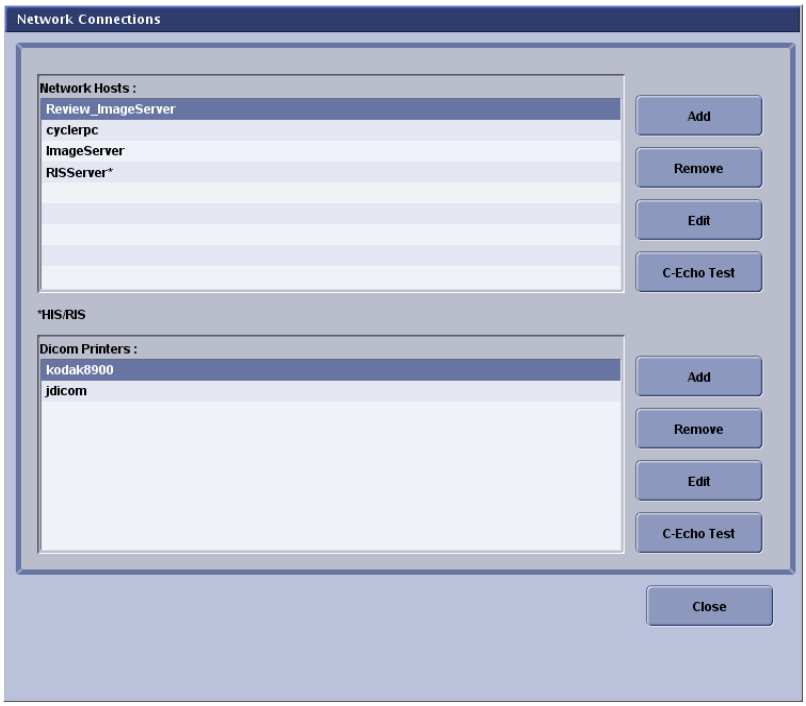
Figure 10-2 Network Connections screen



Add or Edit Network Host

Adding and editing network hosts use very similar process and the same screens as shown in Figure 10-3 and Figure 10-4. Table 10-1 and Table 10-2 describe the fields in detail.

- If editing an existing connection, select the network host and press [EDIT].
- If adding a new connection, press [ADD].

1. Complete requested information for both tabs (see Table 10-1 and Table 10-2) and press [SAVE] to add the network host or save the changes.

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Figure 10-3 Add Network Host – Host tab

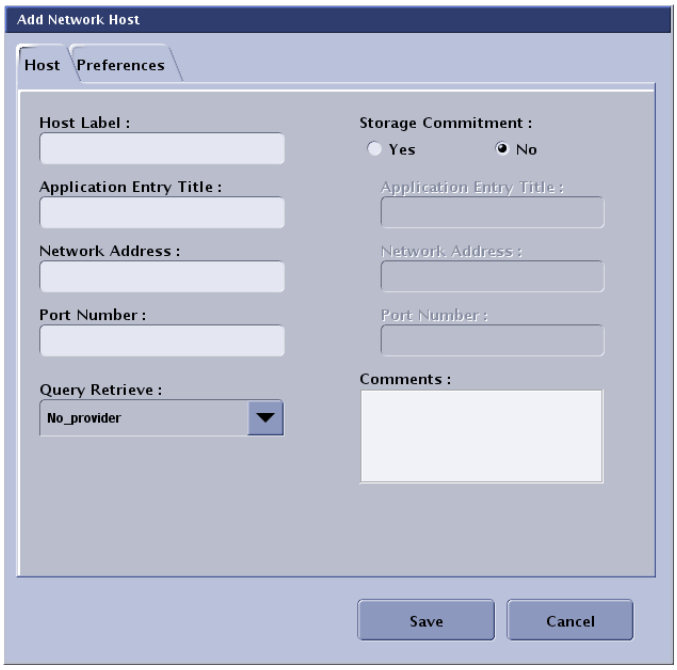

Table 10-1 Add Network Host – Hosts tab description

Function	Description
Host Label	The name of the host that appears in the Network Hosts lists and on the Image Management screen. **NOTE:** Host labels cannot have spaces in the name. Use underscores (_) to separate words.
Application Entry Title	The DICOM application title.
IP Address	The IP address of the network host.
Port Number	The port number for the network host.
Query Retrieve	Sets the type of information the host will provide on query from another host. Available options are: • No provider • Study • Patient
Storage Commitment	Designates if the host will store image data.
Storage Commitment - Application Entry Title	The DICOM application title.

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Function	Description
Storage Commitment - Network Address	The IP address of the storage database.
Storage Commitment - Port Number	The port number of the storage database.
Comments	Allows you to add notes about the network host or configuration.

Figure 10-4 Add Network Host – Preferences tab

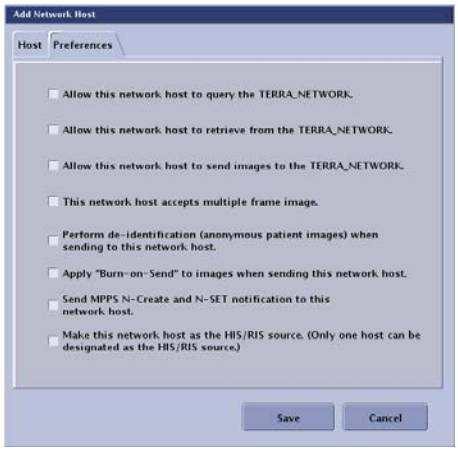
Add Network Host
Host
Preferences
Allow this network host to query the TERRA_NETWORK.
Allow this network host to retrieve from the TERRA_NETWORK.
Allow this network host to send images to the TERRA_NETWORK.
This network host accepts multiple frame image.
Perform de-identification (anonymous patient images) when sending to this network host.
Apply "Burn-on-Send" to images when sending this network host.
Send MPPS N-Create and N-SET notification to this network host.
Make this network host as the HIS/RIS source. (Only one host can be designated as the HIS/RIS source.)
Save
Cancel

Table 10-2 Add Network Host – Preferences tab description

Function	Description
Allow this host to query the (system name)	Allows this host to search and filter the system.
Allow this host to retrieve from the (system name)	Allows this host to open and display exams from the system.
Allow this host to send images to the (system name)	Allows the host to send images to the system.
This network host accepts multiple frame image.	Allows multiple frame images to be send to this network host.
Perform de-identification (anonymous patient images) when sending to this network host.	Automatically de-identifies any images that the system sends to this host. Refer to Chapter 9: Image Management-Make Exam Anonymous (De-Identify) (p. 9-13) for more information about de-identification.

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Function	Description
Apply “Burn-On-Send” to images when sending to this network host.	Burns the VOI LUT (Look-Up Tables) into the DICOM header to be displayed by PACS. Leaving his option unselected sends all available VOI LUTs to the DICOM header for PACS to query and apply. **NOTE:** PACS should be configured to read the first VOI LUT for proper display of images on the Acquisition workstation.
Send MPPS N-Create and N-Set notification to this network host.	This node acts as the Destination for receiving the MPPS N-Create & N-Set Notification. When configured for MPPS, the System sends information like which exam is in progress, when a Study is completed, how many images were acquired, and what was the radiation dose to which the patient was exposed during that session, etc.
Make this host the HIS/RIS source. (Only one host can be designated as the HIS/RIS source.)	Designates the host as the DICOM Worklist provider. Defining the Radiology Information System (RIS) and Hospital Information System (HIS) host allows you to download patient worklists from those networks to your system. **NOTE:** Only one HIS/RIS source may be designated on the system. Selecting this option will de-select any other hosts as the HIS/RIS source.

Remove Network Host

Follow this process to remove a network host.

1. From the Network Connections screen, select the network host.
2. Press [REMOVE].
   - A message appears: “Are you sure you want to remove (host name)?”
3. Press [YES].
   - [CANCEL] closes the message and returns you to the Network Connections screen without removing the connection.
   - The network host is removed.

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Perform C-Echo Test

Use this function when you want to check to see if the system is communicating with a particular network host.

1. Select a host from the Network Hosts list.
2. Press [C-ECHO TEST].
   - A message appears to notify you if the test passed or failed.
   - A "passed" message means that the network host is working and that you can retrieve exams from it or transfer exams to it.

Failed C-Echo Test

A "failed" message means that the system could not contact the network host.

Perform the following tasks to resolve the problem:

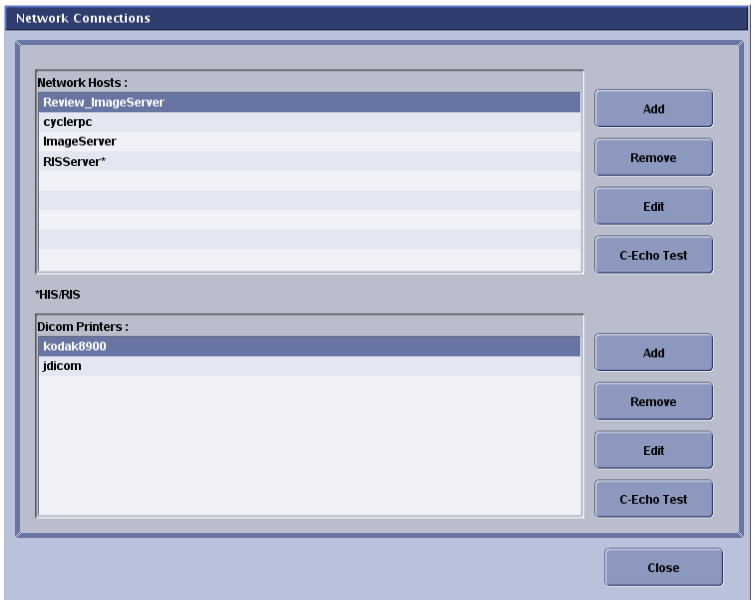
- Re-try the test at a later time. The host may be temporarily unavailable.
- Confirm the host configuration on the Edit screen.
- If the problem persists, contact your technical support group or system administrator.

Printers

Follow this process to access the Network Connections screen.

1. On the Worklist screen, press [UTILITIES].
   - The System-System screen appears.
2. Press [NETWORK CONNECTIONS].
   - The Network Connections screen (Figure 10-5) appears.

Figure 10-5 Network Connections screen



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Add or Edit DICOM Printers

Adding and editing printers use very similar process and the same screens shown in Figure 10-6, Figure 10-7, and Figure 10-8. Table 10-3, Table 10-4, and Table 10-5 describe the fields in detail.

1. If Editing an existing printer's configuration, select the printer from the DICOM Printers list and press [EDIT].
   - If adding a new printer, press [ADD].
2. Complete requested information for all tabs (see Table 10-3, Table 10-4, and Table 10-5) and press [SAVE] to add the printer or save the changes.

Figure 10-6 Add Printer screen – Printer Tab

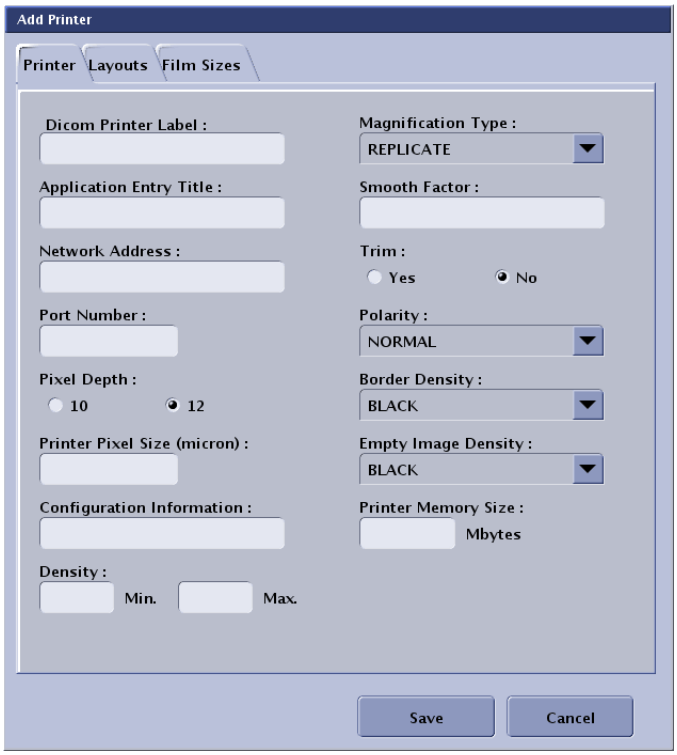

Table 10-3 Add Printer screen– Printer Tab description

Function	Description
DICOM Printer Label	The name of the printer that appears in the DICOM Printers list and on the print setup screens. **NOTE:** DICOM printer labels cannot have spaces in the name. Use underscores (_) to separate words.
Application Entry Title	The DICOM application title.
Network Address	The IP address of the printer.

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Function	Description
Port Number	The port number of the printer.
Pixel Depth	The resolution of the printer.
Printer Pixel Size (micron)	Designates the pixel size the printer uses. This is specified by the printer manufacturer.
Configuration Information	A place for you to add notes about the printer or configuration.
Density	Sets the minimum and maximum density range.
Magnification Type	Available options are: • Replicate • Bilinear • Cubic • None
Smooth Factor	Sets the image smoothing factor.
Trim	Designates if there is to be trim or not.
Polarity	Available options are: • Normal • Reverse
Border Density	Sets the color of the image border. Available options are: • Black • White
Empty Image Density	Sets the color of areas that have no image printed. Available options are: • Black • White
Printer Memory Size	Designates the memory size of the printer. This is specified by the printer manufacturer.

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Figure 10-7 Add Printer screen – Layouts tab

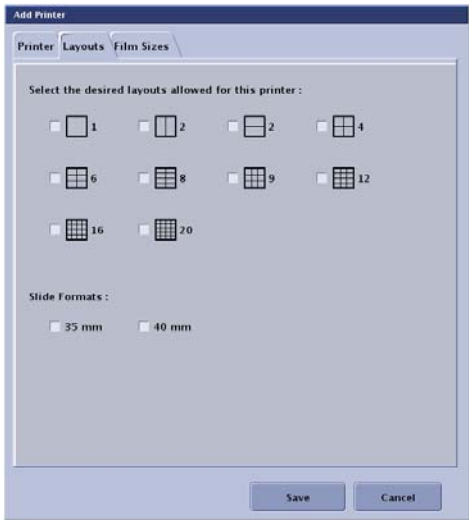

Table 10-4 Add Printer screen– Layouts Tab description

Function	Description
Select the desired layouts allowed for this printer	Selections allow the number of images that may be printed on a single sheet of film or paper. Some selections control the orientation of the images on the page: for example, 2 images per page may be side by side or one on top of the other.
Slide formats	Selections allow the side formats available for the printer, if any.

Figure 10-8 Add Printer – Film Sizes tab

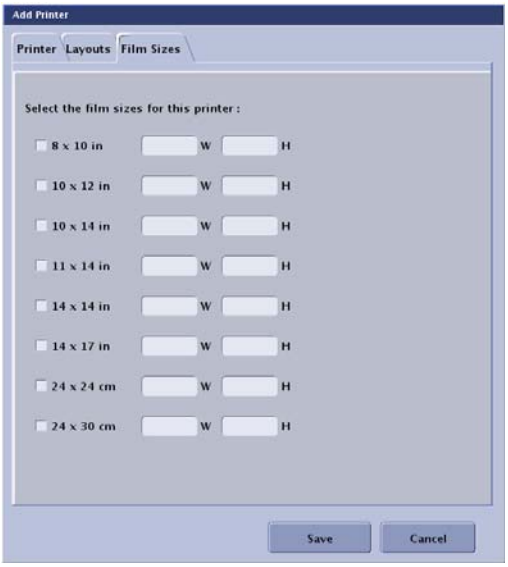

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Table 10-5 Add Printer screen– Film sizes description

Function	Description
Film sizes (8 x 10in)	Selects the sizes of film available for the printer.
Pixel size: W (width)	Sets how wide the film is in pixels. This value is provided by the printer manufacturer based on what the printer supports.
Pixel size: H (height)	Sets how high the film is in pixels. This value is provided by the printer manufacturer based on what the printer supports.

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Remove DICOM Printer

Follow this process to remove a printer.

1. From the Network Connections screen, select the printer.
2. Press [REMOVE].
   - A message appears: “Are you sure you want to remove (printer name)?”
3. Press [YES].
   - [CANCEL] closes the message and returns you to the Network Connections screen without removing the connection.
   - The printer is removed.

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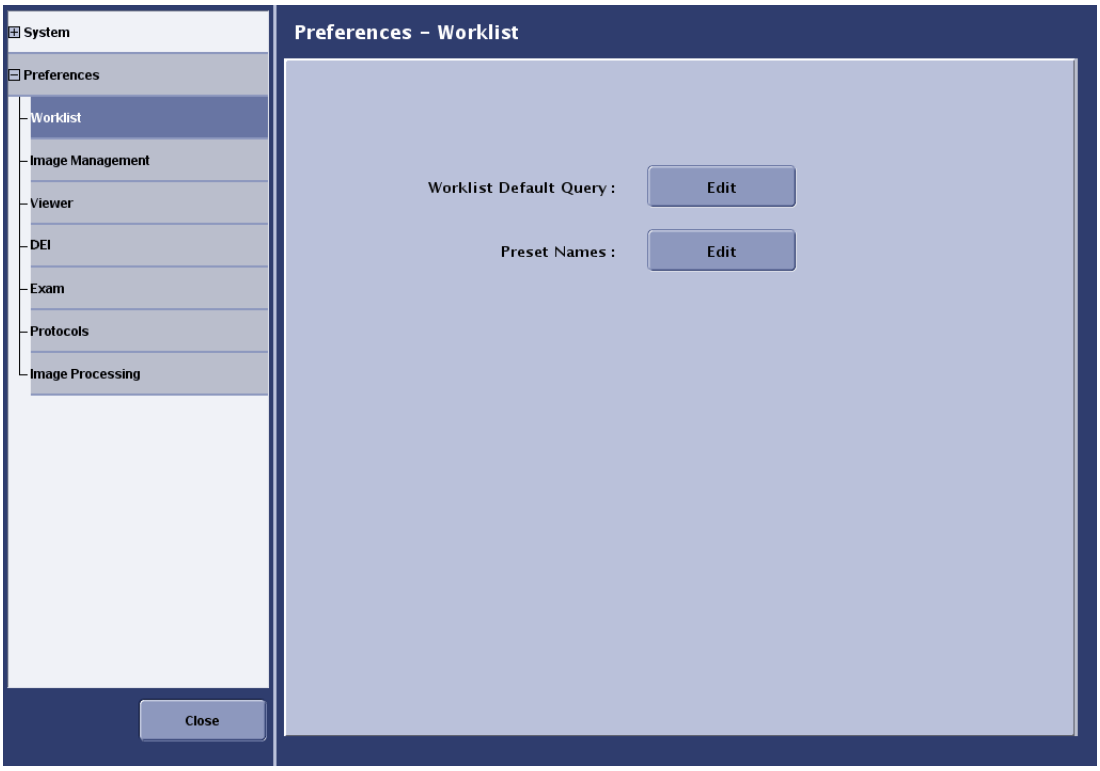
Worklist

Worklist preferences are available from the Utilities screen.

1. On the Worklist screen, press [UTILITIES].
2. Select **Preferences > Worklist**.

Figure 10-9 Preferences – Worklist screen



Default Query

The Worklist Default Query controls the amount of HIS/RIS information that appears on the Worklist and allows you to enable and configure the auto-refresh function.

1. Complete or edit the Worklist Default Query screen (Figure 10-10). Table 10-6 describes the fields in detail.
2. Press [SAVE] to change the Default Query.

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Figure 10-10 Worklist Default Query screen

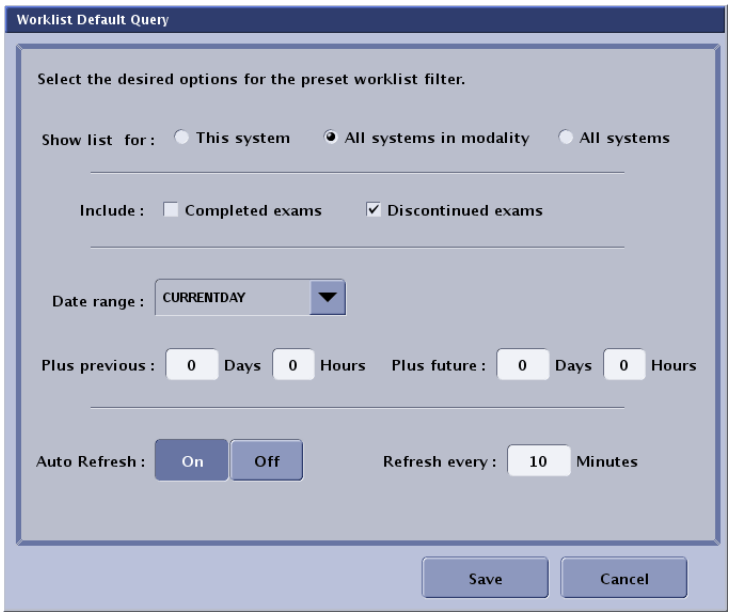

Table 10-6 Worklist Default Query description

Function	Description
Show list for	Determines Worklist items by system or modality. • This system – exams for this unit only • All systems in modality – exams for all digital x-ray • All systems – exams for all modalities
Include	Allows you to include or exclude completed or discontinued exams on the Worklist.
Date Range	Selects the date range of scheduled procedures to show on the Worklist. Available options are: • All • Current Day
Plus previous __ Days __ Hours	Shows procedures that are scheduled for the specified time before the selected date range. **NOTE:** If the "Days" value is left blank, the worklist query will be based on current time plus the number of hours entered.
Plus future __ Days __ Hours	Shows procedures that are scheduled for the specified time after the selected date range. **NOTE:** If the "Days" value is left blank, the worklist query will be based on current time minus the number of hours entered.

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Function	Description
Auto Refresh [ON] [OFF]	Turns Auto Refresh on or off.
Refresh every __ Minutes	If Auto Refresh is [ON], sets how often (in minutes) the Worklist refreshes. The interval may be between 1 and 9999 minutes.

Auto Refresh

The Worklist Auto-Refresh feature automatically refreshes the Patient Worklist at predefined time intervals.

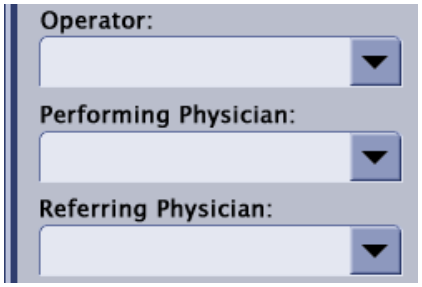
NOTE: You will not be able to make selections or access Worklist functions while the Worklist is refreshing.

NOTE: For large facilities, it is recommended that the auto refresh interval be set to a short time, for example, every 1 or 2 minutes. The system will refresh more often, but each refresh will take less time to complete.

Preset Names

The Preset Names screen (Figure 10-12) allows you to add, remove, or edit the names that appear on the Add Patient/Patient Information screen's Operators, Performing Physicians, and Referring Physicians drop-down lists (Figure 10-11).

Figure 10-11 Drop-down lists on the Add Patient screen



1. Follow the procedures below to Add, Edit, or Remove Preset Names.
2. When finished, press [SAVE] to retain the changes you made.

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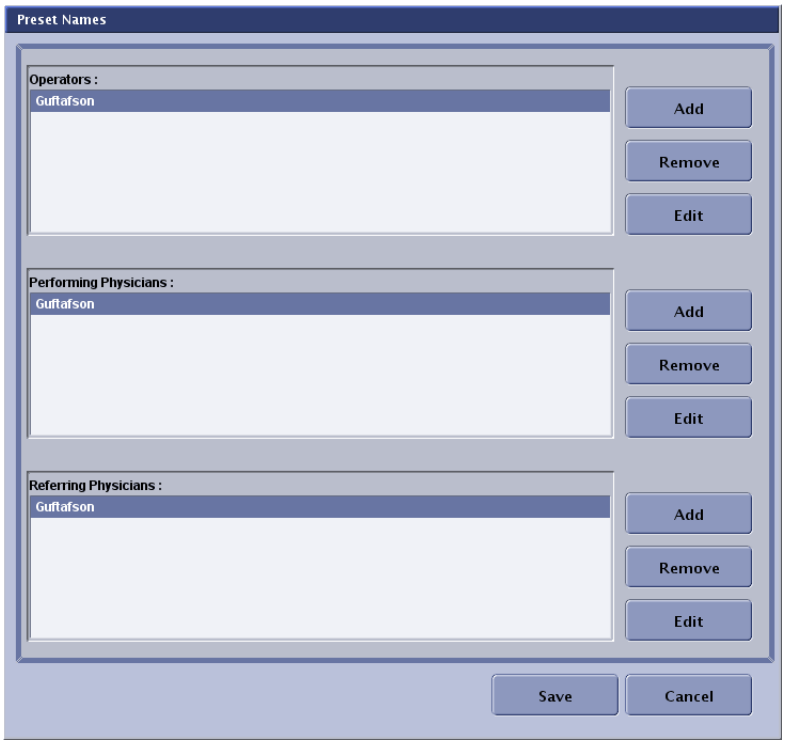
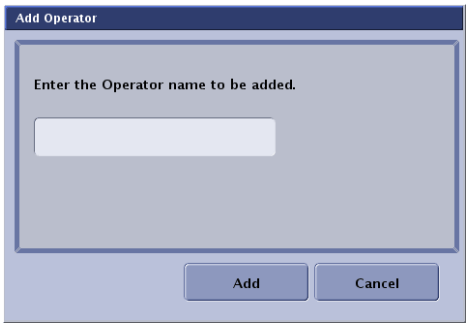
Figure 10-12 Preset Names screen



Add Preset Names

1. Press [ADD] for the appropriate group.
2. Type the name to add.
3. Press [ADD].



Edit Preset Names

1. Select the name to change.
2. Press [EDIT] for the group.
3. Edit the name as appropriate.
4. Press [SAVE].

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Remove Preset Names

1. Select the name to remove.
2. Press [REMOVE] for the group.
3. Press [OK] to remove the name.
   - Press [NO] to keep the name.

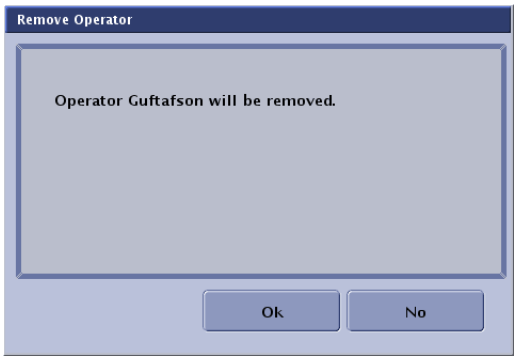

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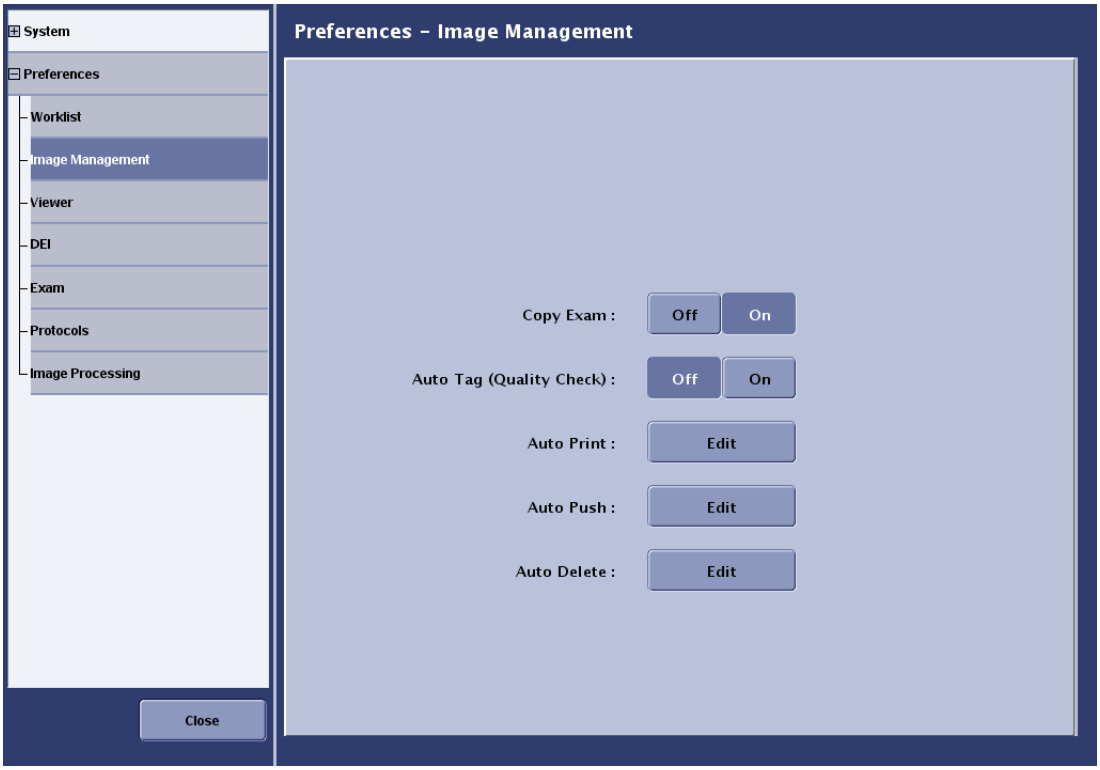
Image Management

Image Management preferences allow you to enable and configure the Copy Exam, Auto Tag, Auto Print, Auto Push, and Auto Delete functions.

Figure 10-13 Preferences – Image Management



Copy Exam

Enabling the Copy Exam function allows exams to be copied between the local databases and network hosts. It also allows exams to be copied to a CD.

There is no configuration for this function; it is either enabled (ON) or disabled (OFF).

Follow this process to enable or disable Copy Exam:

1. From the Worklist screen, press [UTILITIES].
2. Select **Preferences > Image Management**.
3. Press Copy Exam [ON] to enable the function.
   - Copy Exam [OFF] disables the function.
4. Press [CLOSE].

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Auto Tag (Quality Check)

Enabling Auto Tag (or Quality Check) provides an indicator on the Image Viewer screen to mark an image of acceptable quality. Auto Print and Auto Delete can be configured to act upon images that have the Quality Check mark.

There is no configuration for this function; it is either enabled (ON) or disabled (OFF).

Follow this process to enable or disable Auto Tag:

1. From the Worklist screen, press [UTILITIES].
2. Select **Preferences > Image Management**.
3. Press Auto Tag [ON] to enable the function.
   - Auto Tag [OFF] disables the function.
4. Press [CLOSE].

Auto Print

Default Print/Auto Print (Figure 10-14) allows you to configure your printer parameters. This is done so that you do not need to select all the parameters each time you print an image.

You can select a primary and alternative location as well as how many copies you want each time you print.

Follow this process to configure Auto Print.

1. From the Worklist screen, press [UTILITIES].
2. Select **Preferences > Image Management**.
3. Click Auto Print [EDIT].
   - The Default Print/Auto Print screen appears.
4. Complete the information as described in Table 10-7.
5. When finished, press [SAVE] to retain your changes.
6. Press [CLOSE].

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Figure 10-14 Auto Print

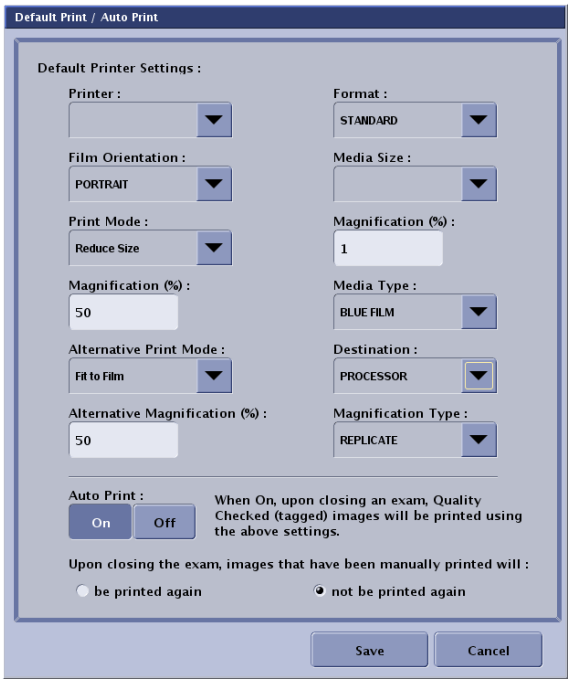

Table 10-7 Auto Print Functions

Function	Description
Printer	Lists the printers and laser cameras connected to your system.
Film Orientation	Sets if the image will print on the film horizontally or vertically. Available options are: • Portrait – vertical film orientation • Landscape – horizontal film orientation
Print Mode	Provides options on the size of the image data printed. Available options are: • True Size • Fit to Film • Reduce Size • Orthopedic Magnification (if enabled)
Magnification (%)	If Reduced Size is selected as the Print Mode, allows you to enter the percent by which the image will be reduced. The accepted range is between 40% and 90%. If True Size or Fit to Film are selected as the Print Mode, the text box remains disabled.

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Function	Description
Alternate Print mode	Available options are: • Reduce Size • Left/Right Justified • Fit to Film
Alternative Magnification (%)	Allows you to enter an image reduction factor for the secondary printer.
Format	Allows you to choose the formats available for the selected printer. Available options are: • Standard • Slide • Superslide
Media Size	Allows you to choose the size of the media available for the selected printer.
Media Type	Allows you to choose the media types available for the selected printer. Available options are: • Paper • Clear Film • Blue Film
Destination	Allows you to choose the destinations available for the selected printer. Available options are: • Magazine • Processor
Magnification Type	Allows you to choose the magnification types available for the selected printer. Available options are: • Replicate • Bilinear • Cubic • None
Auto Print [ON] [OFF]	If Auto Tag is enabled, turning Auto Print [ON] will automatically print all images that have the Auto Tag mark when the Image Viewer screen is closed. [OFF] disables the Auto Print function.
Upon closing the exam...	Allows the choice to automatically re-print or to not print any images that were printed manually from the Image Viewer screen.
[SAVE]	Saves the current selections and values as the default printing configuration.

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Function	Description
[CANCEL]	Closes the Auto Print screen without saving your changes.

Orthopedic Magnification

Orthopedic Magnification is an option that allows you to introduce a fixed amount of magnification percentage so that the image size will match previously calibrated orthopedic templates.

NOTE: The functions described in this section are only available if Orthopedic Magnification is enabled. GE Service personnel enable Orthopedic Magnification and enter the Configurable Magnification Factor (CMF) through the Services User Interface. The CMF is the amount of magnification applied to all Orthopedic Magnification functions. Only GE Service personnel are able to change the CMF.

You may select Orthopedic Print as a default print setting for manual printing and auto print.

NOTE: When "Orthopedic Print" is selected as the Print Mode, Alternative Print Mode is disabled.

NOTE: When "Orthopedic Print" is selected as the Print Mode, all images printed through Auto Print will have magnification applied.

Auto Send (Auto Push)

Auto Send automatically transfers images to another network device when the exam is closed. Auto Send is enabled and configured from the Utilities – Preferences screen.

Follow this process to configure Auto Send.

1. From the Worklist screen, press [UTILITIES].
2. Select **Preferences > Image Management**.
3. Click Auto Push [EDIT].
   - The Auto Send screen appears.
4. Complete the information as described in Table 10-8.
5. When finished, press [SAVE] to retain your changes.

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Figure 10-15 Auto Send

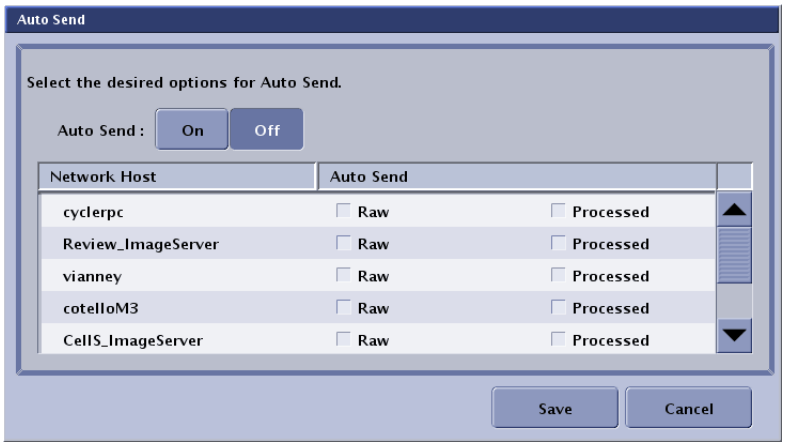

Table 10-8 Auto Send Functions

Function	Description
Auto Send [ON] [OFF]	Turns Auto Send on or off. Selecting On allows you to configure the default Auto Send settings.
Network Host column	Lists the available network locations where images may be transferred. Refer to Network Connections (p. 10-2) for information about how to configure the available Network Hosts.
Auto Send column	Allows you to choose which images are sent to each network host. You may choose either Raw or Processed, both, or none. Leaving both choices unselected means that no images will be sent to the network host.
[SAVE]	Saves your selections as the default settings and closes the Auto Send screen.
[CANCEL]	Closes the screen without saving your changes.

Auto Delete

Auto Delete automatically deletes images when the image database does not have enough space. Auto Delete is enabled from the Utilities – Preferences screen.

Follow this process to configure Auto Delete.

1. From the Worklist screen, press [UTILITIES].
2. Select **Preferences > Image Management**.
3. Click Auto Delete [EDIT].
   - The Auto Delete screen appears.
4. Complete the information as described in Table 10-9.

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5. When finished, press [SAVE] to retain your changes.
6. Press [CLOSE].

Figure 10-16 Auto Delete

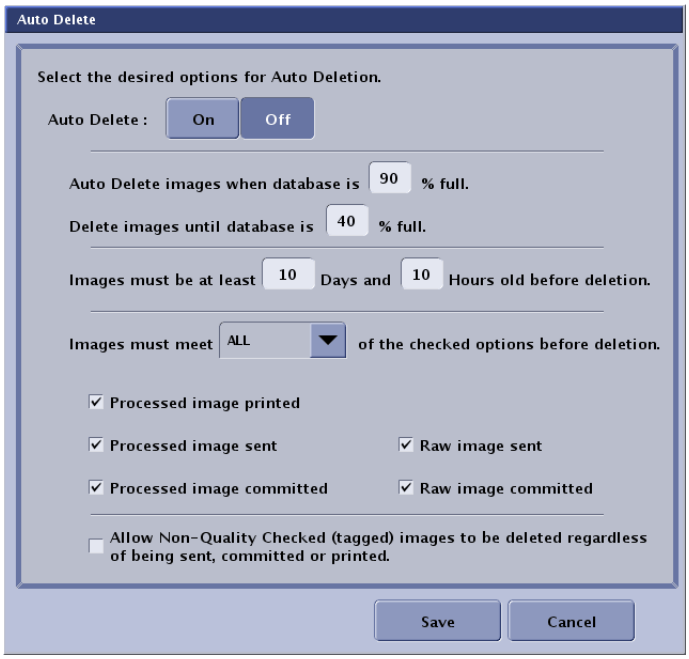

Table 10-9 Auto Delete functions

Function	Description
Auto Delete [ON] [OFF]	Turns Auto Delete on or off.
Auto Delete images when database is __% full.	Specifies when to auto delete images based on database size.
Delete images until database is __% full.	Specifies how many images to delete based on database size.
Images must be at least __ Days old before deletion.	Specifies how old (in days) an image must be for it to be deleted. Images that are less than the entered number will not be deleted.
Images must meet __ of the checked options before deletion.	Allows you to constrain the deletion of raw and processed images based upon checkbox selection (see below). Available options are: • All • Any • None

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Function	Description
Processed image printed	Selecting the Print parameter allows auto deletion of images that have been printed.
Processed image sent	Allows auto deletion of processed images with no errors that have been sent to another viewing station.
Processed image committed	Allows auto deletion of processed images that have been sent to a long term device with storage commitment capability. Storage commitment for a network host is configured from the System – System screen, Network Connections.
Allow Non-Quality Checked (tagged) images to be deleted regardless of being sent, committed or printed.	Allows auto deletion of any images that do not have the Auto Tag (Quality Check) mark. **NOTE:** If any of the images in the series have the Auto Tag (Quality Check) mark, the series will not auto delete.
[SAVE]	Saves your changes and closes the screen.
[CANCEL]	Closes the screen without saving changes.

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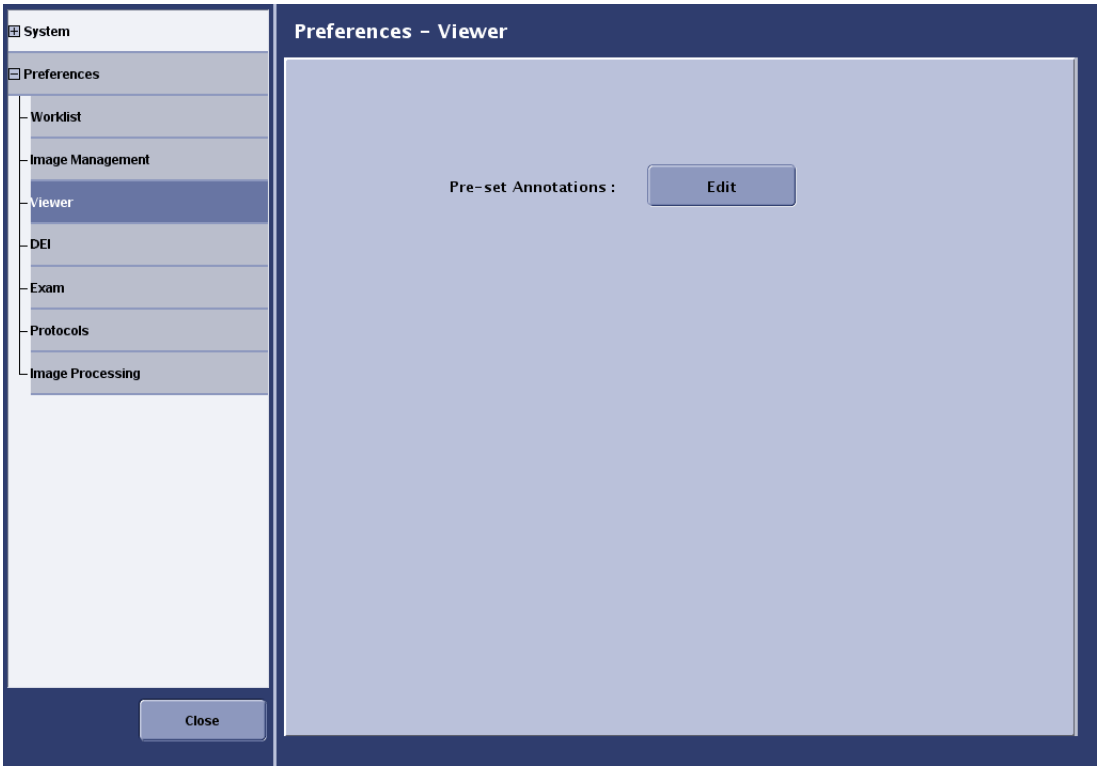
Image Viewer

Figure 10-17 Preferences - Viewer screen



Configure Pre-set Annotations

Viewer Preferences allow you to add, edit, or remove pre-set annotations.

Follow this process to configure pre-set annotations.

1. From the Worklist screen, press [UTILITIES].
2. Select **Preferences > Viewer**.
3. Press Pre-set Annotation [EDIT].
   - The Pre-set Annotations editing screen (Figure 10-18) appears.

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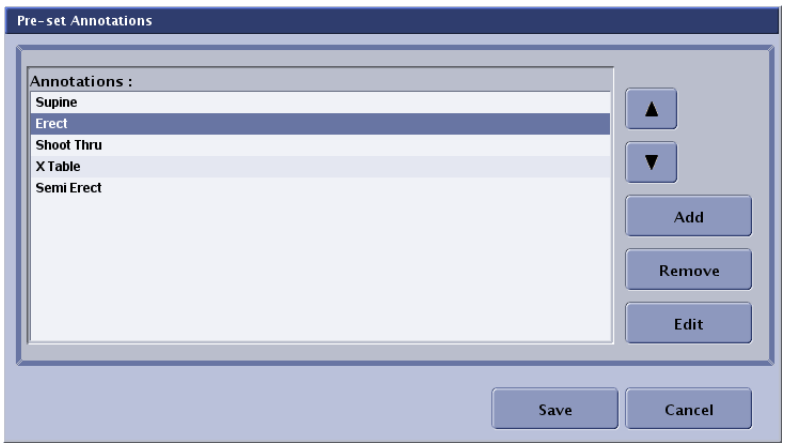
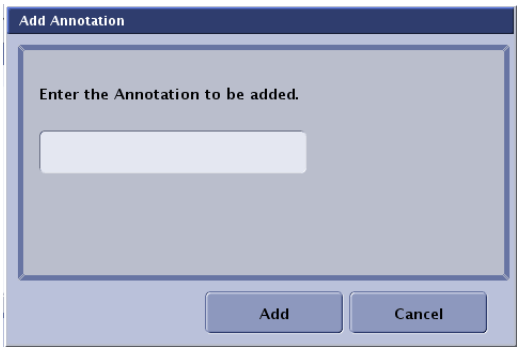
Figure 10-18 Pre-set Annotation editing



4. To change the order of the list, select the annotation.
5. Press the [▲] or [▼] button to move the item up or down the list.
6. Continue with Add Pre-set Annotation (p. 10-27), Edit Pre-set Annotation (p. 10-27), or Remove Pre-set Annotation (p. 10-28).
7. When finished, press [SAVE] to retain your changes.
8. Press [CLOSE].

Add Pre-set Annotation

1. From the Pre-set Annotations screen, press [ADD].
2. Enter the text of the annotation.
3. Press [ADD].



Edit Pre-set Annotation

1. From the Pre-set Annotations screen, select the annotation.
2. Press [EDIT].
3. Edit the text of the annotation.

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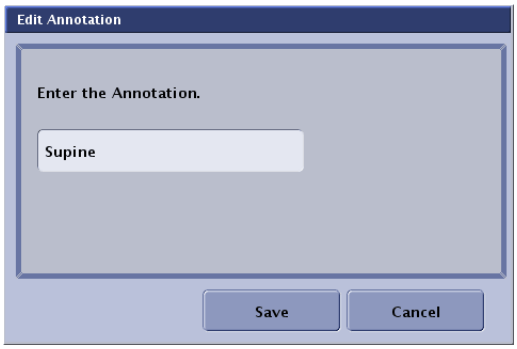
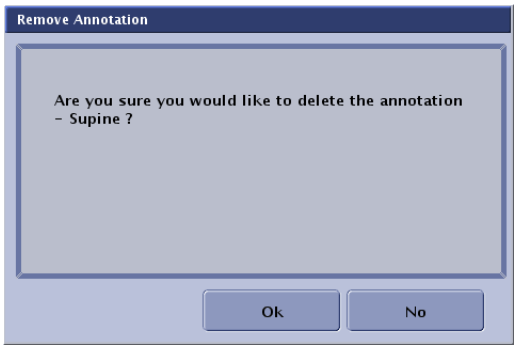
4. Press [SAVE].



Remove Pre-set Annotation

1. From the Pre-set Annotations screen, select the annotation.
2. Press [REMOVE].
   - A message appears: "Are you sure you would like to delete the annotation – (annotation name)?"
3. Press [OK].



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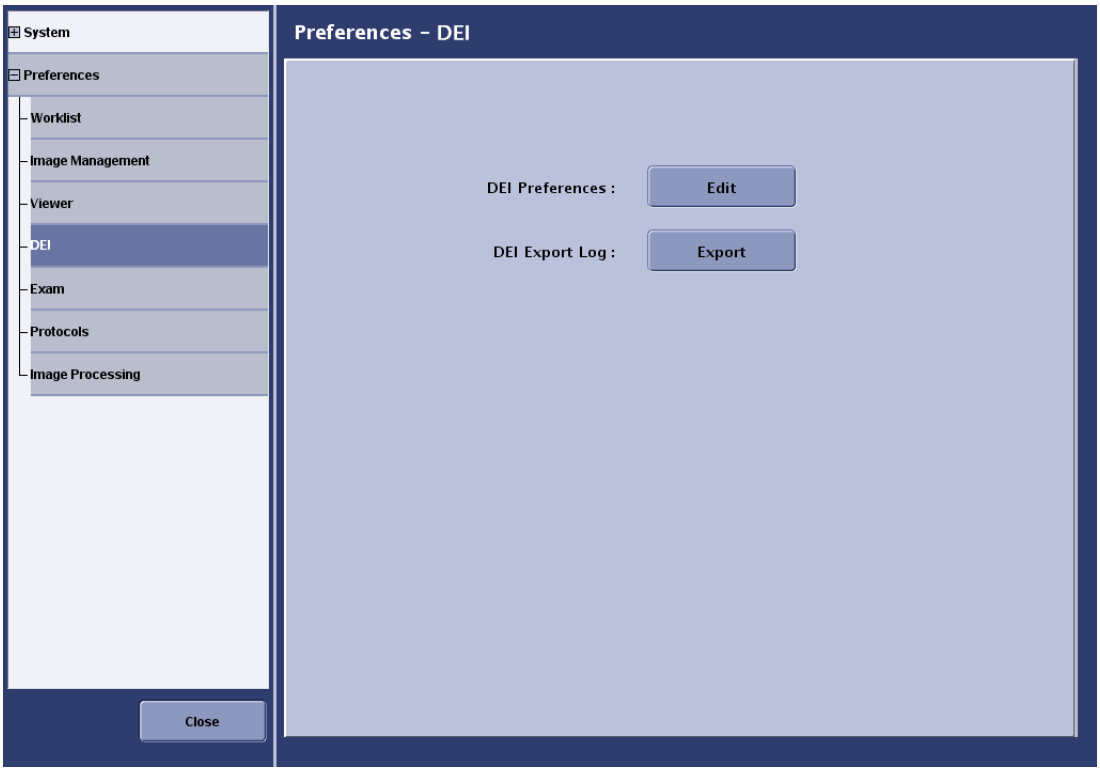
DEI (Detector Exposure Index)

Figure 10-19 Preferences - DEI screen



The Detector Exposure Index screen allows you to control if or how the DEI is displayed on the Image Viewer screen and to change the lower and upper limits for anatomical views.

These settings determine how DEI is displayed for all images.

Follow this process to change the DEI settings.

1. From the Worklist screen, press [UTILITIES].
2. Select **Preferences > DEI**.
3. Press **DEI Preferences** [EDIT].
   - The Detector Exposure Index screen (Figure 10-20) appears.
4. Continue with Change the DEI Display (p. 10-30) or Change the Lower and Upper Limits (p. 10-30).

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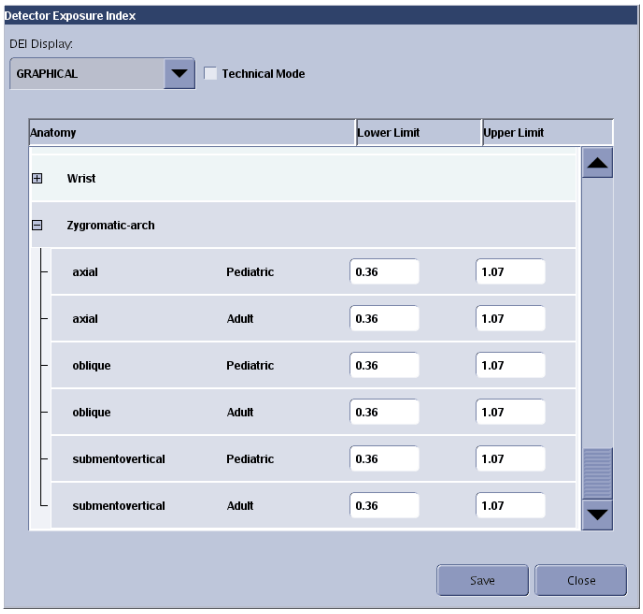
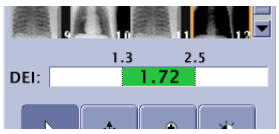
Figure 10-20 Detector Exposure Index screen



Change the DEI Display

1. On the Detector Exposure Index screen, press the **DEI Display** drop-down list to open it.
2. Select the display option.
   - Available options are:
     - No Display In this example, there is no DEI information displayed on the Image Viewer screen.
     - Numerical

In this example, only numerical DEI information is displayed on the Image Viewer screen.
     - Graphical 

In this example, DEI information is displayed is both numerically and graphically on the Image Viewer screen. This is the recommended display option.
3. Press [SAVE] to apply the change and close the screen.
   - [CLOSE] closes the screen without saving the changes.

Change the Lower and Upper Limits

1. On the Detector Exposure Index screen, press an anatomical category to expand it.
   - Press the category again to close it.
2. Change the lower and upper limits in the text boxes as appropriate for the view.

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3. Repeat steps 1 and 2 for all applicable anatomical categories.
4. Press [SAVE] when finished to apply the changes and close the screen.
   - [CLOSE] closes the screen without saving the changes.

Enable or Disable Technical Mode

Technical Mode is a special setting that configures the system for image quality testing and detector calibration. When Technical Mode is enabled, DEI is calculated using the central area of the image (512 pixels x 512 pixels) regardless of the imaged anatomy.

IMPORTANT!: Do not acquire exam images when Technical Mode is enabled. The use of Technical Mode is reserved for image testing and calibration purposes only.

The checkbox (Figure 10-21) indicates if Technical Mode is enabled. Check or uncheck the box as appropriate and press [SAVE] to apply the change and close the screen.

Figure 10-21 Technical Mode checkbox

Export DEI Log

The DEI log records the exposure levels of images. Medical Physicists in your facility or GE Service Personnel use the log to determine if there is a problem with the detector and to determine what adjustments to make to correct exposure errors.

Follow this process to export the DEI log onto a CD.

1. Insert a blank CD-R disc.
2. From the Worklist screen, press [UTILITIES].
3. Select **Preferences > DEI**.
4. Press the **DEI Export Log** [EXPORT] button.
5. Remove the disc when export is complete.

Exam

There are currently no preferences to configure on this screen.

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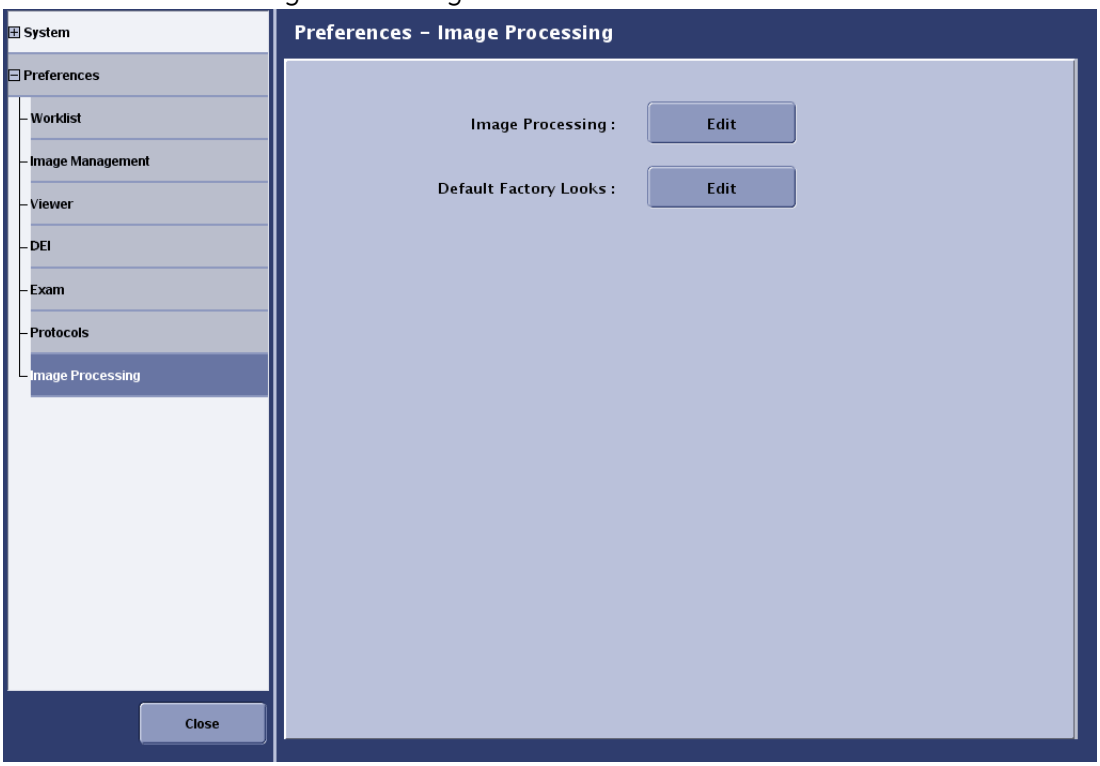
Image Processing

The Image Processing preferences allow you to change which look is the default for the anatomical view. Image Processing Preferences also allow you to view the settings of default factory looks or to create up to five (5) custom looks.

NOTE: Custom looks and the default looks mapping can be backed up by having GE Service personnel perform a system backup. It is recommended that a system backup be performed after any change to the default looks mapping or when custom looks are built. Ask your GE Service personnel to perform the system backup at their next visit. GE Service personnel can restore the settings from the backup, if necessary.

Figure 10-22 Preferences – Image Processing



Change Default Factory Looks for Exams

The Default Factory Looks screen (Figure 10-23) allows you to change the default processing setting for all 34 representative anatomical views, and then map this change to related anatomical views. Note that this may over-ride existing default settings.

At the initial applications setup, the radiologist chooses the default look for each anatomical view. Application specialists assign the looks to the system.

Follow this process to change the default factory looks.

1. From the Worklist screen, press [UTILITIES].
2. Select **Preferences > Image Processing**.

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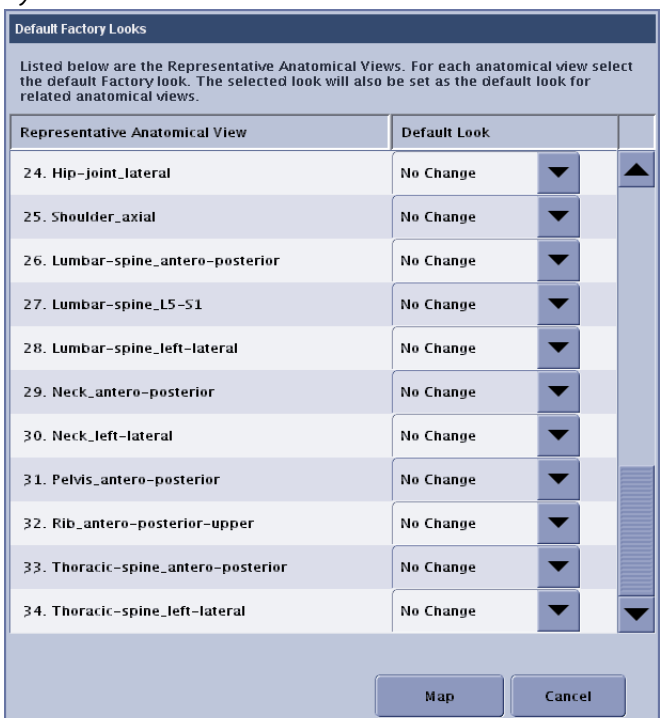
3. Press Default Factory Looks [EDIT].
4. Use the drop-down lists to change the default for the desired anatomical views.
5. When finished, click [MAP] to save the changes.
   - A message appears: "Default look settings for selected Representative Anatomical Views will be mapped to related anatomical views."
6. Click [CONFIRM] to apply the looks settings. [CONFIRM] will close the message and return you to the Image Processing screen.
   - [CANCEL] closes the message and returns you to the Default Factory Looks screen.

Figure 10-23 Default Factory Looks



Build Custom Looks

Looks are the way an image is processed to be viewed by a radiologist for interpretation.

Looks are pre-defined combinations of brightness, contrast, edge enhancement, and tissue equalization (TE). Refer to Tissue Equalization Overview (p. 10-37) for more information.

Factory Look descriptions:

- Factory Look 1 – similar to analog film, low edge, no TE
- Factory Look 2 – low CR look, low edge, moderate tissue contrast
- Factory Look 3 – moderate CR look, low edge, TE
- Factory Look 4 – highly digital look, high edge, high TE

Follow this process to create an new custom look.

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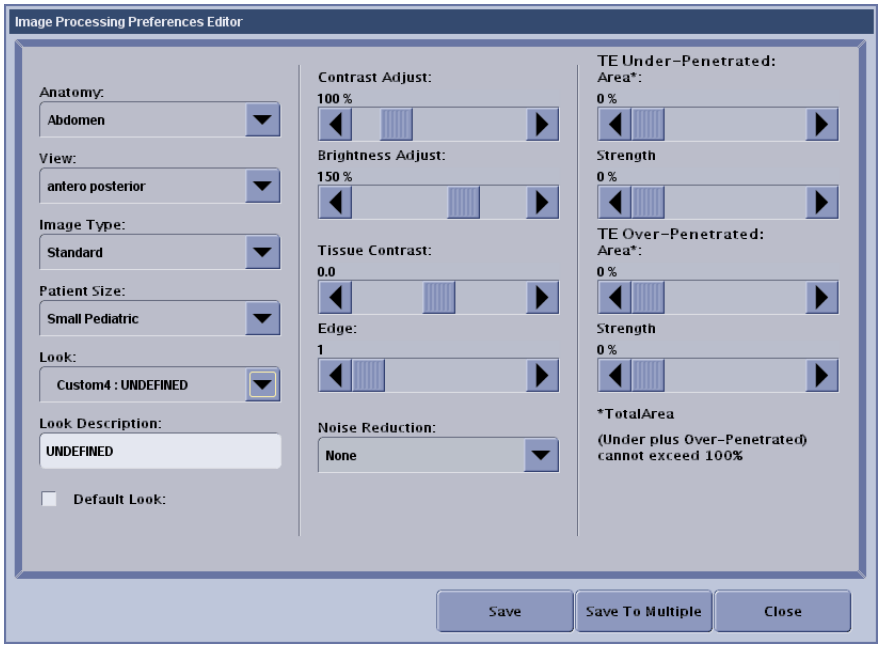
Recommendation: When building a custom look, start with the factory look that is closest to the desired result. Write down the values and apply them to a new custom process. Then change the applicable variables.

1. From the Worklist screen, press [UTILITIES].
2. Select **Preferences > Image Processing**.
3. Press Image Processing [EDIT].
   - The Image Processing Preference Editor (Figure 10-24) appears.

Figure 10-24 Image Processing Preference Editor



4. Select the **Anatomy** (for example: Chest, Abdomen, Lumbar Spine, etc.).
5. Select the **View** (for example: antero-posterior or lateral).
6. Select the **Image Type** (some systems may only have Standard image type available).
7. Select the **Patient Size**. Available options are: Small Adult, Medium Adult, Large Adult, Small Pediatric, Medium Pediatric, or Large Pediatric.
8. Select the **Look**. Choose the first "Undefined" Custom look.

NOTE: If a Factory Look is selected, parameters are read-only. Only Custom processing looks can be changed.

9. Enter new name in **Look Description** to rename the look:
   - The system will not accept a new look if the name remains "Undefined."
10. Check the **Make Default** box to set this look at the default for the selected Anatomy.
11. Adjust parameters as described in Table 10-10. Parameters may be adjusted in any order.

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Table 10-10 Image Processing parameters

Parameter	Definition
Contrast Adjust	Adjusts image contrast. Also known as window width. • Move the slider right for more contrast (towards pure black and white). • Move the slider left for less contrast (towards uniform gray). Range: 25% – 400% with increment of 1%
Brightness Adjust	Adjusts image brightness from 25-210%. Also known as window level. • Move the slider right for a lighter image. • Move the slider left for a darker image. **NOTE:** Brightness Adjust and Contrast Adjust should not be used for per-image tuning/correction of brightness and contrast. They are used to modify the default look of images from a particular exam. For example, if images from a particular type of exam are appearing consistently lighter than they should be, the Brightness Adjust slider can be moved left to adjust. However, for small alterations of brightness on a particular image, use the Brightness and Contrast controls in the Image Viewer screen.
Tissue Contrast	Controls the general contrast between the thick and thin anatomy. • Move the slider right to decrease bone/soft-tissue contrast. • Move the slider left to increase bone/soft-tissue contrast. Range: –0.15 to 0.15 with 0.01 increments. **NOTE:** Unlike Tissue Equalization, which controls contrast within under-penetrated (thick) or over-penetrated (thin) areas, Tissue Contrast controls the general contrast **between** the thick and thin anatomy. For example, Tissue Contrast can be used in combination with Tissue Equalization to define a Chest PA look that is equalized in the lung fields, but with light spine/ribs.
Edge	The amount of detail visible in bone structures. Increased edge equals increased detail. • Move the slider right to make images sharper. • Move the slider left to make images smoother. Range: 1 to 10 (discrete setting) with increments of 1

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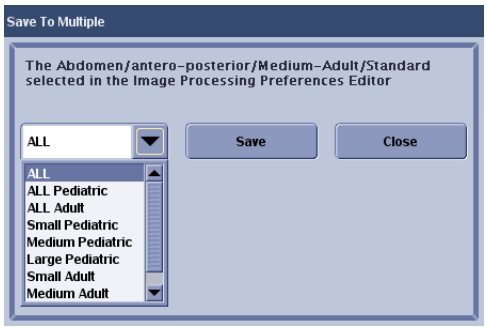
Parameter	Definition
Noise Reduction	Suppresses the mottle noise in denser areas of the anatomy while preserving detail in the rest of the image. Available options are: • None – no noise reduction • Low • Medium • High – maximum noise reduction **NOTE:** The noise reduction feature suppresses the mottle noise in denser areas of the anatomy while preserving detail in the rest of the image. The algorithm takes into account tissue penetration and dose reaching the detector. For example, if two Chest PA images were acquired on the same patient, one with much higher dose than the other, noise reduction may only affect the lower dose (higher noise) image. In general, the lowest Noise Reduction setting that produces the desired image quality should be selected.
TE Settings	See Tissue Equalization section for range and effect of TE sliders. **NOTE:** The combined total of the TE Under-penetrated and TE Over-penetrated areas cannot exceed 100%. The slider will automatically stop and a message appears: "The Total Area cannot exceed 100%. Reduce the (Under- or Over-) Penetrated area to proceed."

12. When finished adjusting parameters, press [SAVE] or [SAVE TO MULTIPLE].
    - [SAVE] applies the parameters to the currently selected patient size.
      - A message appears: "Save changes?"
13. Press [YES].
    - [SAVE TO MULTIPLE] applies the parameters to multiple patient sizes within the selected anatomy.
      - The Save to Multiple screen appears.
14. Select the **Patient Size** to save the new look to.
15. Press [SAVE].



16. Press [CLOSE] on the Image Processing Preference Editor.

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Change Image Processing from the Viewer

Changing the image processing from the Image Viewer screen allows the user to preview the effect of different looks (factory or custom) before applying the look to the image.

The Image Processing settings may be accessed from the Image Viewer screen or the Utilities screen.

From the Image Viewer screen:

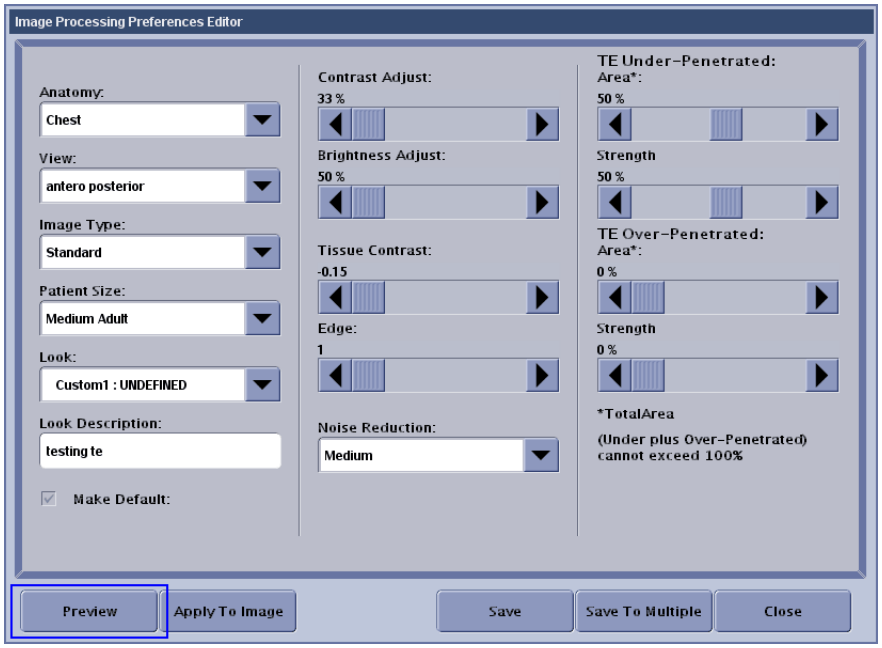
1. Select the **Reprocessing** palette from the tool selection list.
2. Press [EDIT PROC].

Follow the steps listed above to make the processing changes.

When opened from the Image Viewer screen the, Image Processing Preference Editor screen also has a [PREVIEW] and [APPLY TO IMAGE] button.

- [PREVIEW] applies the settings to the currently selected image in the Image Viewer screen so that you can see the effect before saving the changes.
- [APPLY TO IMAGE] creates a new instance of the image processed with the selected look.

Figure 10-25 Image processing preferences editor screen opened from the Viewer



Tissue Equalization Overview

Tissue Equalization (TE) is an advanced image-processing algorithm that improves contrast and visibility in over-penetrated and under-penetrated regions of an image without compromising the contrast in other regions of interest. In combination with the wide dynamic range of the digital detector, TE allows display of more information collected in a single shot, reducing re-takes and increasing throughput.

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TE Usage

Over-penetrated Regions

An over-penetrated region in an image results from x-rays passing through a relatively less dense region of the anatomy such as soft tissue (skin edge).

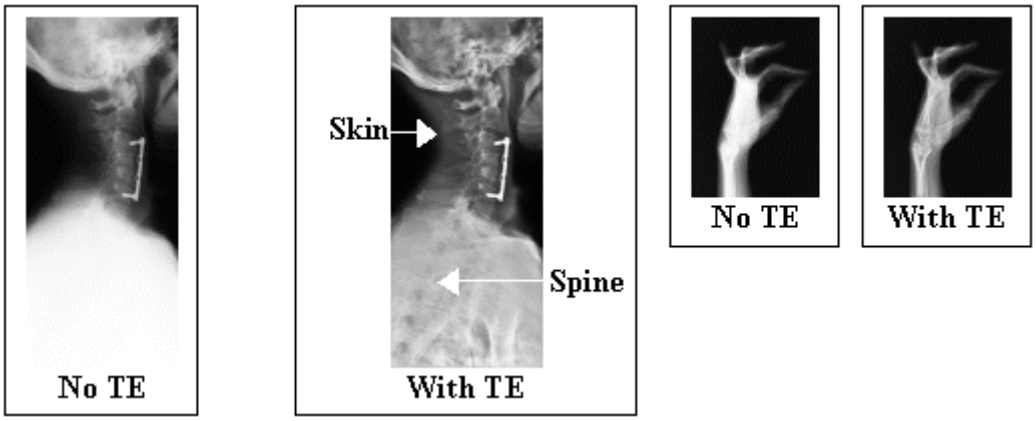
Over-penetrated regions of an image appear darker with reduced contrast. Using TE, the contrast in such regions can be enhanced to improve visualization of soft-tissue. TE can also be used to enhance vessel contrast in lungs. In Figure 10-26, the skin edge around the neck is more clearly defined with TE.

Under-penetrated Regions

An under-penetrated region in an image results from insufficient x-rays passing through relatively dense anatomical regions. For example, anatomy containing dense tissue (abdomen) and bone (ankles/wrists/ shoulders) result in under-penetrated images.

Under-penetrated regions of an image such as the cervical and thoracic spine appear white- white spine obscured by the overlaying anatomy like the white shoulders. Using TE, the overlaying anatomy can be made grayer making the underlying spine more visible (Figure 10-26). A hand image can similarly be displayed with improved bone contrast. This makes TE an invaluable tool in visualizing the entire bone field.

Figure 10-26 Comparison with and without Tissue Equalization



TE Parameters

TE uses the information in the image to improve visualization. Two user-defined parameters; AREA and STRENGTH; control the extent and amount of TE that is applied to the image. There is an AREA and STRENGTH parameter for over-penetrated regions and an AREA and STRENGTH parameter for under-penetrated regions.

Area

The AREA parameter defines the extent of application of the TE algorithm to the image. Increasing AREA increases the number of image pixels to which TE is applied. For example, in Figure 10-27, setting the AREA to 30% for under-penetrated region uses the pixels within the dotted ROI. Increasing AREA to 60% increases the number of pixels where TE is applied, as indicated by the solid ROI.

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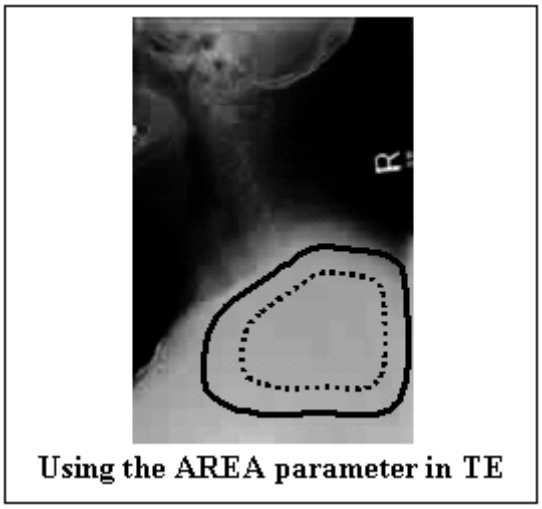
Figure 10-27 Using the AREA parameter in TE



The combined AREA parameters for the over and under-penetrated regions cannot be greater than 100%. For example if the AREA parameter for over-penetrated regions is set to 40%, the AREA parameter for under-penetrated regions cannot be greater than 60% (100-40).

Strength

The STRENGTH parameter affects the grayness of a region when TE is applied to it. For example, increasing STRENGTH for under-penetrated regions such as shoulders makes a white region grayer. Increasing STRENGTH for over-penetrated regions such as lungs makes a black region grayer. In both cases, increasing STRENGTH generally makes the region grayer.

The effect of varying AREA and STRENGTH in TE is demonstrated in Figure 10-28 for under-penetrated regions. Increasing STRENGTH while keeping the AREA constant makes the pixel grayer in the shoulder region. Increasing AREA extends the region that becomes gray.

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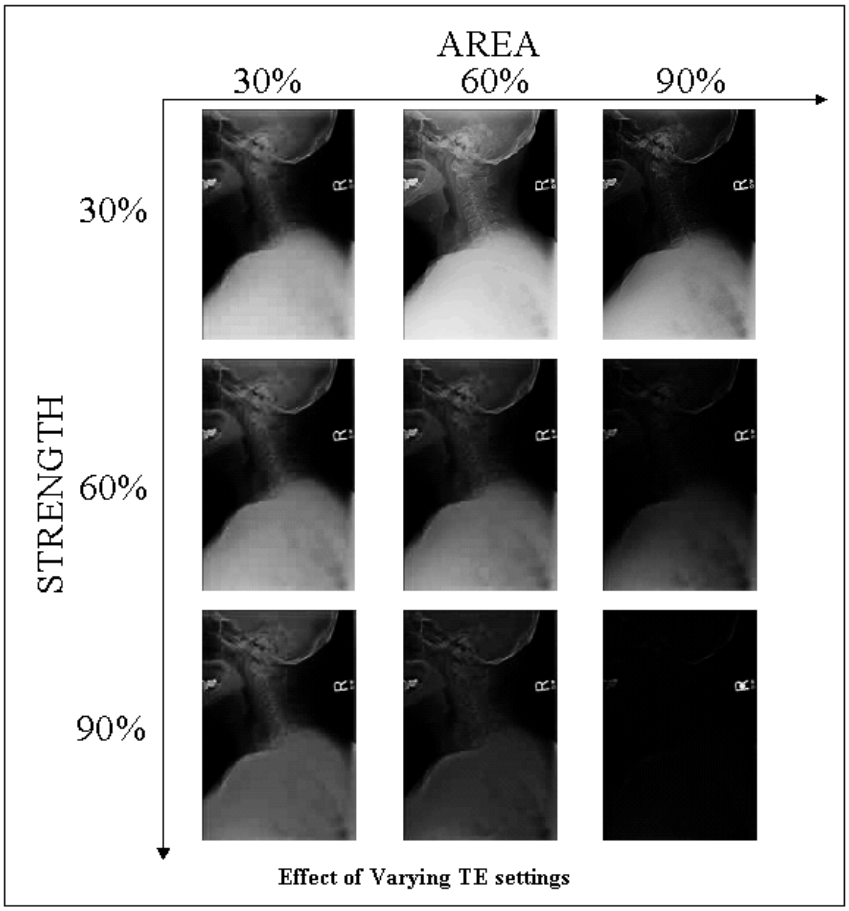
Figure 10-28 Varied TE settings



NOTE: Unlike Tissue Equalization, which controls contrast within under-penetrated (thick) or over-penetrated (thin) areas, Tissue Contrast controls the general contrast between the thick and thin anatomy. For example, Tissue Contrast can be used in combination with Tissue Equalization to define a Chest PA look that is equalized in the lung fields, but with light spine/ribs.

Protocols

Protocols preferences allow you to create backup copies of the protocol database, retrieve saved backups, and create new protocols.

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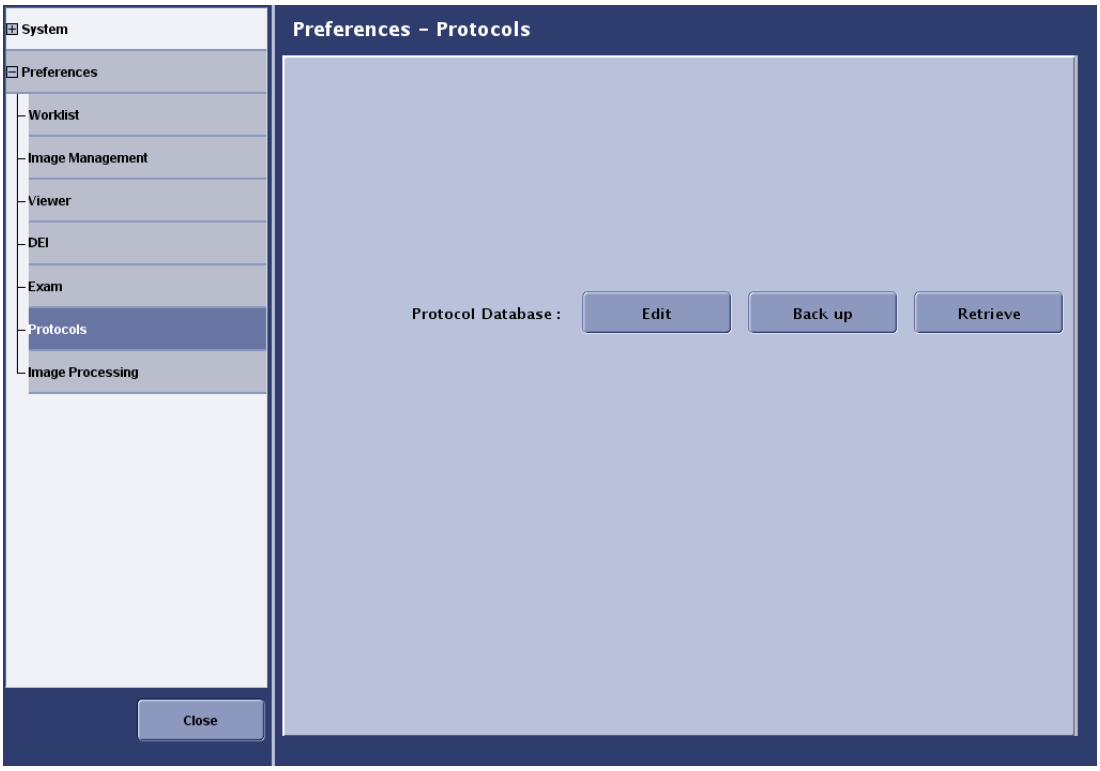
Figure 10-29 Preferences - Protocols screen



Backup Protocol Database to CD

The Backup function allows you to save the entire protocols database (parameters) to a CD. This is important when editing protocols; backup ensures that the current database stays intact. Backup is also important in case of system failure and all protocol information is lost. If necessary, the old database can be retrieved and used.

Follow this process to back up the database to a CD.

NOTE: Always use a new, blank CD-R for each back up.

DO NOT use re-writable (CD-RW) disks. The system cannot write to this type of disk.

1. Insert a blank CD into the CD tray.
2. From the Worklist screen, press [UTILITIES].
   - The Utilities screen appears.
3. Select **Preferences > Protocols**.
4. Press [BACK UP].
   - A message appears: “Press OK to continue with Protocol Database back up.”

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5. Press [OK].
   - A message appears: “Protocol Database back up in progress. Please Wait. This might take 2-3 minutes.“
     - [CANCEL] stops the database backup.
   - When backup is complete, a message appears: “The Protocol Database back up operation is successful.“
6. Press [OK] to dismiss the message.
7. Remove the CD from the CD tray.
8. Label the CD and store it in a safe place.

Retrieve Protocol Database from CD

The Retrieve function allows you to recover a protocol database that was saved to a CD.

NOTE: When retrieving, the procedures saved on the CD will overwrite all of the procedures on the system.

Follow this process to retrieve a protocol database from CD.

1. From the Worklist screen, press [UTILITIES].
   - The Utilities screen appears.
2. Select **Preferences > Protocols**.
3. Insert the CD with the saved protocols database into the CD tray.
4. Press [RETRIEVE].
   - A message appears: “Press OK to continue with Protocol Database retrieve.”
5. Press [OK].
   - The saved protocol database is loaded onto the system.
6. Remove the CD from the CD tray. Store the CD in a safe place.

Edit Protocol Database

The Protocol Editor allows you to create custom acquisition protocols. It allows the creation of anatomical categories, exam sets, and individual views for exams.

It allows the edit and removal of categories, exams, and views.

NOTE: Names of categories, exams, and views cannot contain spaces. Use underscores (_) to separate words (for example, “Neck_AP”).

NOTE: It is recommended that you back up the database to CD before and after custom changes are made. Database backup is done by pressing the [BACKUP] button on the Preferences - Protocols screen. Refer to Backup Protocol Database to CD (p. 10-41) for more information.

Follow this process to access the Protocol Database Editor.

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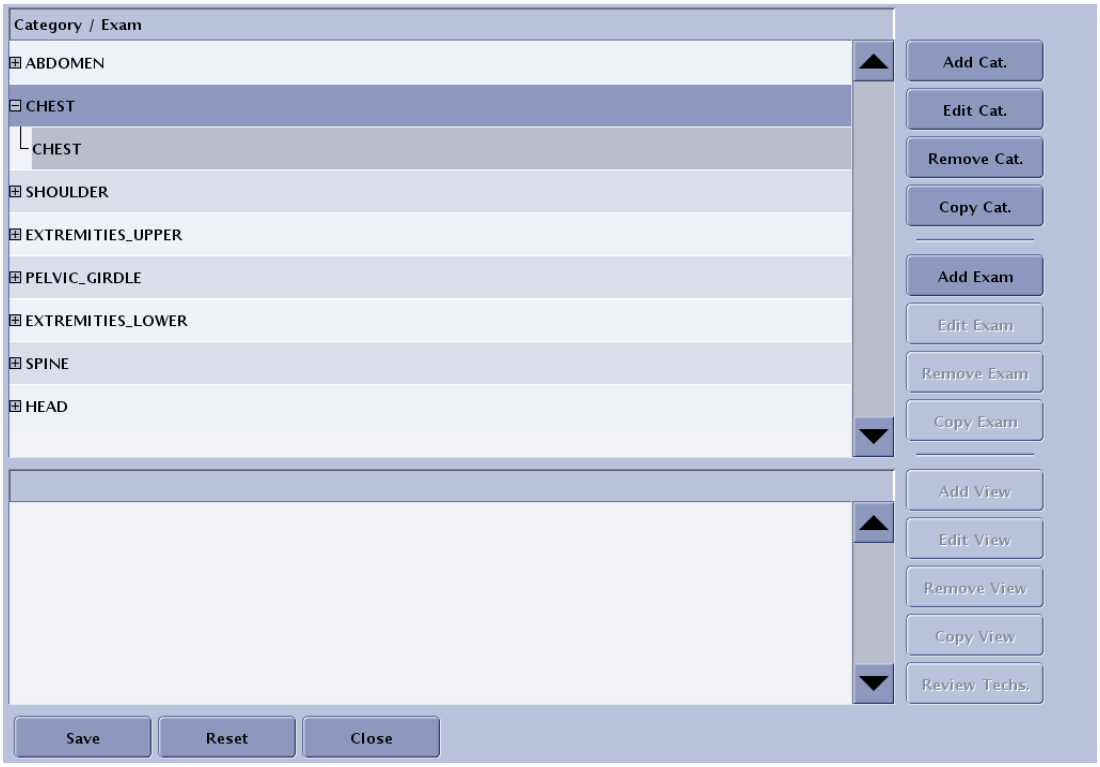
1. From the Worklist, select [UTILITIES].
2. Select **Preferences > Protocols**.
3. Press [EDIT].
   - The Exam Menu appears.
4. Continue with Add or Edit Category (p. 10-43), Add or Edit Exam (p. 10-44) or Add or Edit View (p. 10-45)

Figure 10-30 Exam Menu



Add or Edit Category

NOTE: The screens and process to edit a category are the same as for adding a category.

From the Exam Menu:

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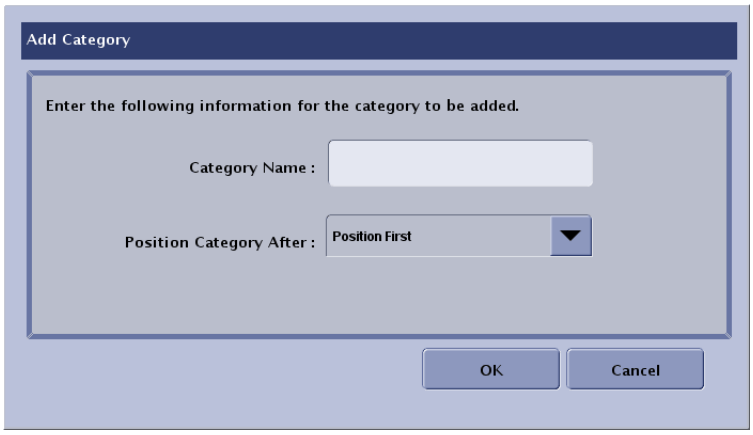
1. Press [ADD CAT] or [EDIT CAT].
   - If editing a category, select the category first, then click [EDIT CAT].
   - The Add Category (or Edit Category) screen appears.



2. Type a **Category Name**. (Use underscores instead of spaces.)
3. From the **Position Category After** drop-down list, select the placement of the new category on the category list.
4. Press [OK].
5. Continue with Add or Edit Exam (p. 10-44).

NOTE: Exams and views must be added or copied into the new category in order for it to be fully functional.

Add or Edit Exam

NOTE: The screens and process to edit an exam are the same as for adding a exam.

From the Exam Menu:

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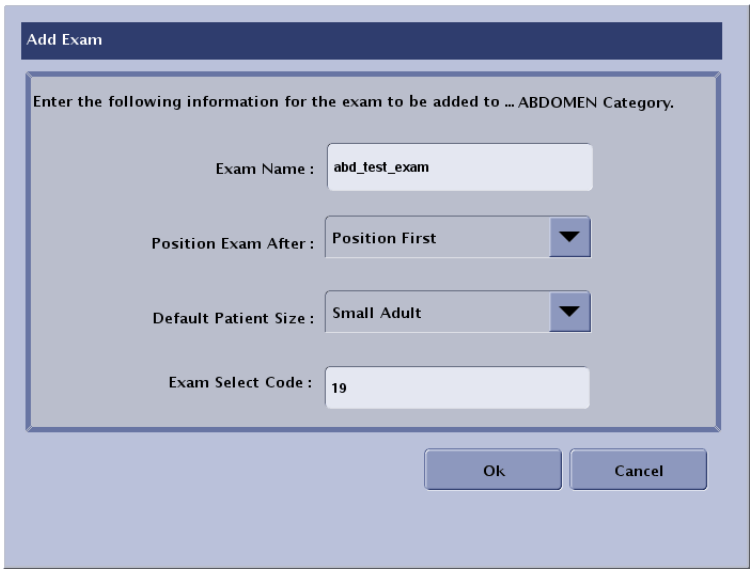
1. Select the category for the new exam.
2. Press [ADD EXAM] or [EDIT EXAM].
   - The Add Exam (or Edit Exam) screen appears



3. Type an **Exam Name**. (Use underscores instead of spaces.)
4. From the **Position Exam After** drop-down list, select the position of the exam within the category.
5. Select the **Default Patient Size** for the exam.
6. Press [OK].
7. Continue with Add or Edit View (p. 10-45).

NOTE: Exams must be populated with new or copied views after creation in order to be fully functional

Add or Edit View

NOTE: The screens and process to edit a view are the same as for adding a view.

This process has multiple screens.

From the Exam Menu:

1. Expand the Category.
2. Select the Exam to add or copy the new view to.

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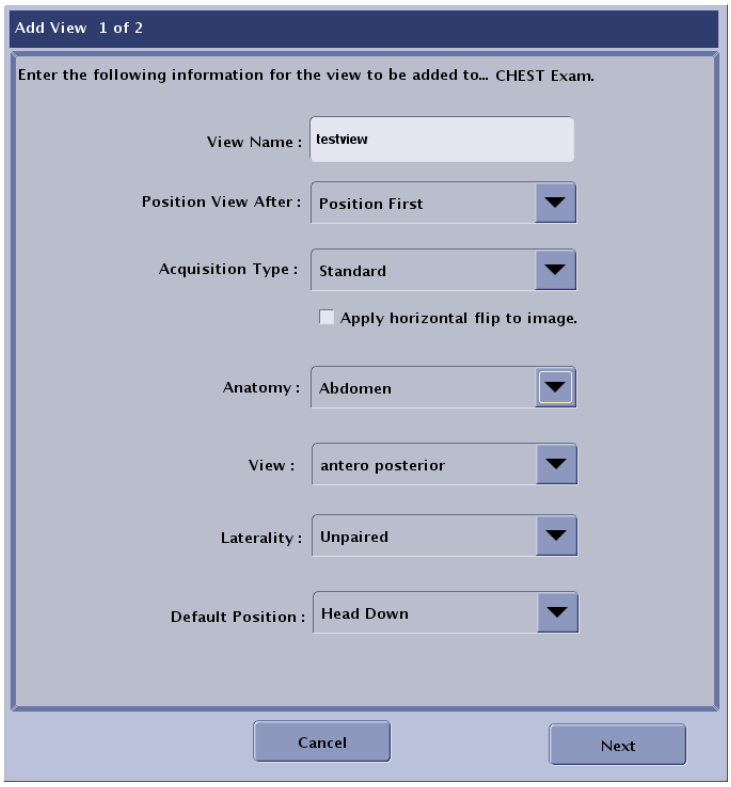
3. Press [ADD VIEW] or [EDIT VIEW].
   - The Add View (or Edit View) screen (1 of 2) appears.



4. Type a **View Name**. Do not use spaces. Use underscores (_) to separate words.
5. From the **Position View After** drop-down list, select the placement of the view within the exam.
6. Select the **Acquisition Type**.
   - Available options are:
     - Standard
     - Bone
     - Soft Tissue
7. Check if **horizontal flip** is to be applied when displaying the image.
8. Select the **Anatomy**.

NOTE: The selected anatomy will determine the image processing for the view. Be sure to select the appropriate anatomy for the body part imaged.

9. Select the most appropriate **View** (AP, Lat, etc.).
   - The selected anatomy determines which views are available.

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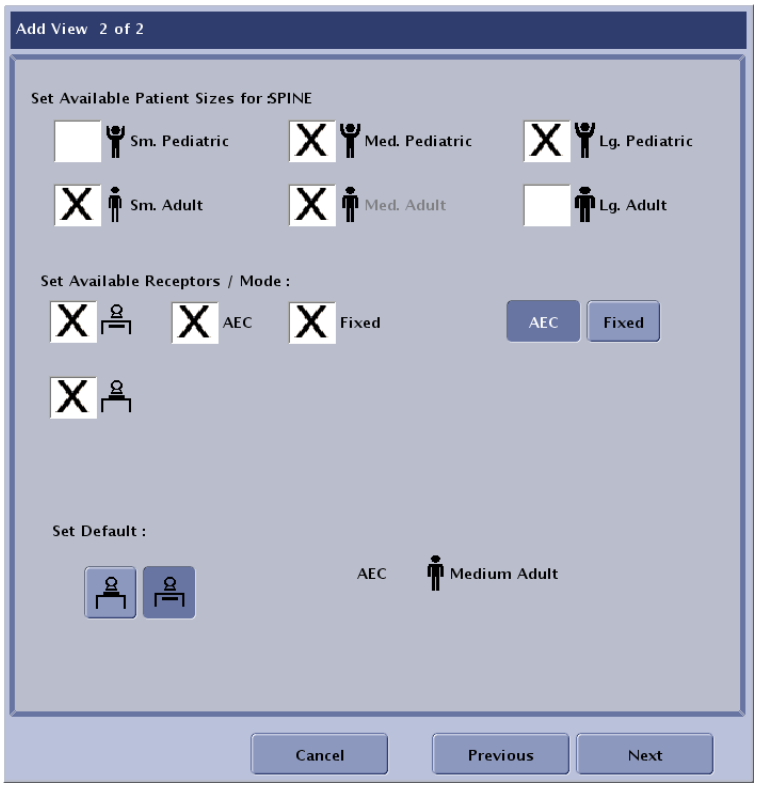
10. Select the **Laterality**:
    - The selected anatomy determines which laterality options are available.
      - If the anatomy is unpaired, then Unpaired is the only available selection.
      - If the anatomy is paired, the available sections are: Both, Left, and Right.
      - Paired anatomy enables the Patient Side control on the Image Acquisition screen. Refer to Chapter 6: Image Acquisition for more information.
11. Select the Default Position:
    - The selected anatomy determines which positions are available. In general:
      - If the anatomy is unpaired, the selections are Head Down or Head Up
      - If the anatomy is paired, the selections are Digits to Back, Digits to Feet, Digits to Front, Digits to Head.
12. Press [NEXT].
    - The Add View (or Edit View) screen (2 of 2) appears.



13. Select all **Patient Sizes** you want available for the view. The default size will automatically be selected.
14. Select **Receptors** and **Modes** for each selected receptor.
15. Select the **Default Receptor** - cassette or GE Digital Detector.

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16. Press [NEXT].
    - The Review screen appears.

CHEST / CHEST /
testview
Standard Acquisition
kV
mA
mAs (Fixed only)
msec (b = back-up time)
Speed
SID
Ion Chamber (AEC Only)
Focal Spot
Cu Filter
Grid
Small Adult FIXED 50 100 2.5 25.0 400 100 N/A Small no out
Med Adult FIXED 50 100 2.5 25.0 400 100 N/A Small no out
Small Ped FIXED 50 100 2.5 25.0 400 100 N/A Small no out
Med Ped FIXED 50 100 2.5 25.0 400 100 N/A Small no out
Small Adult FIXED 50 100 2.5 25.0 400 100 N/A Small no out
* Med Adult FIXED 50 100 2.5 25.0 400 100 N/A Small no out
Small Ped FIXED 50 100 2.5 25.0 400 100 N/A Small no out
Med Ped FIXED 50 100 2.5 25.0 400 100 N/A Small no out
Exam Menu
Edit Technique

    - The default patient size is shown with an asterisk (*) to the left of the size indicator.

17. Select the patient size to edit.
18. Press [EDIT TECHNIQUE].

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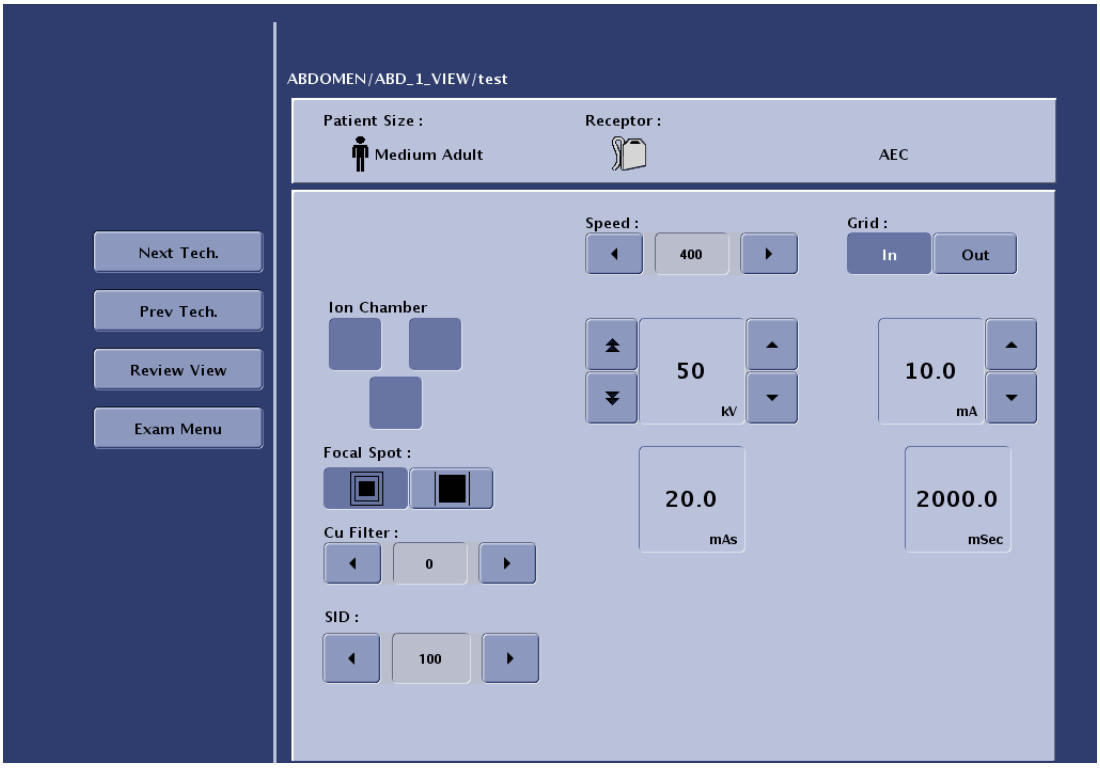
Figure 10-31 Edit Techniques screen



19. Change the technique parameters as appropriate.
20. Upon completion for each view, press [NEXT TECH] adjust techniques for the next configured patient size.
21. When finished, press [EXAM MENU].
    - The Exam Menu appears.
22. Press [SAVE].
    - A message appears: "Changes made to the Protocol Database will be saved."
    - [RESET] clears all changes to the database since the last time it was saved.
23. Press [OK].
    - The Preferences – Protocols screen appears.
24. Press [CLOSE].
    - A message appears: "Changes have been made to the Protocol Database. Would you like to save these changes?"
25. Press [YES].
    - The Exam Menu screen closes and returns you to the Preferences - Protocols screen.

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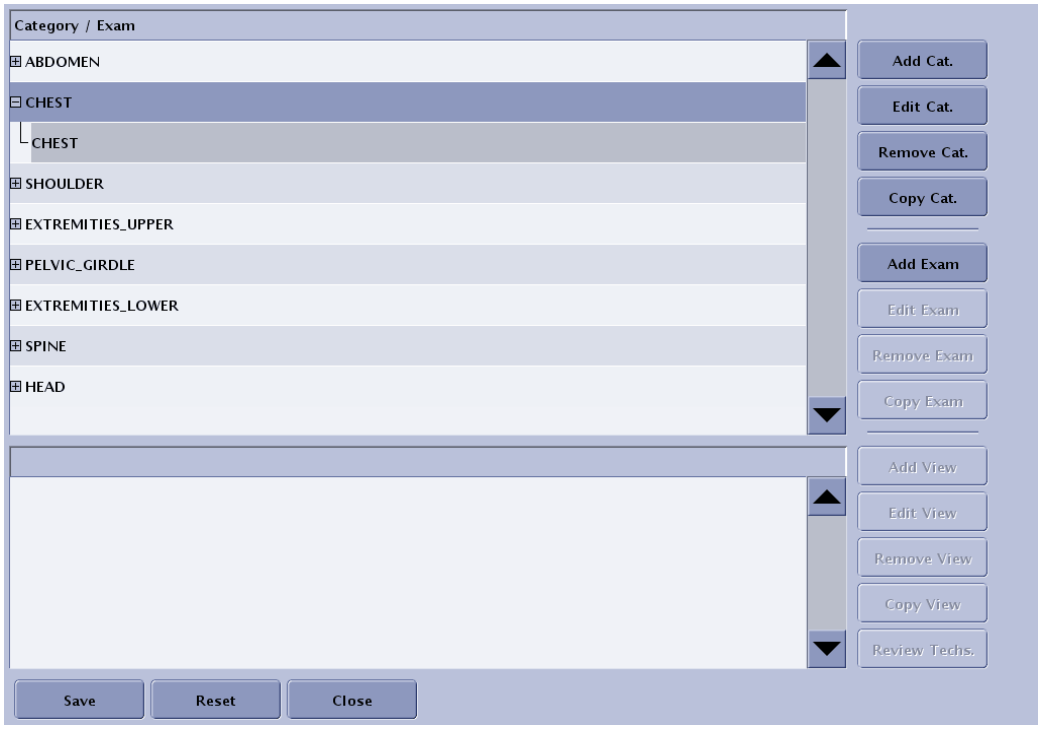
Protocol Editor Copy Functions

Follow this process to access the Protocol Database Editor.

1. From the Worklist, select [UTILITIES].
2. Select **Preferences > Protocols**.
3. Press [EDIT].
   - The Exam Menu appears.

Figure 10-32 Exam Menu



4. Continue with Copy Category (p. 10-50), Copy Exam (p. 10-51), or Copy View (p. 10-51).

Copy Category

1. Select the Category to copy
2. Press [COPY CAT].
3. Enter the new name to use or retype the existing name

NOTE: If reusing the existing name, be sure to include any underscores in the title.

4. Select the **position** on the Category list.
5. Press [OK].

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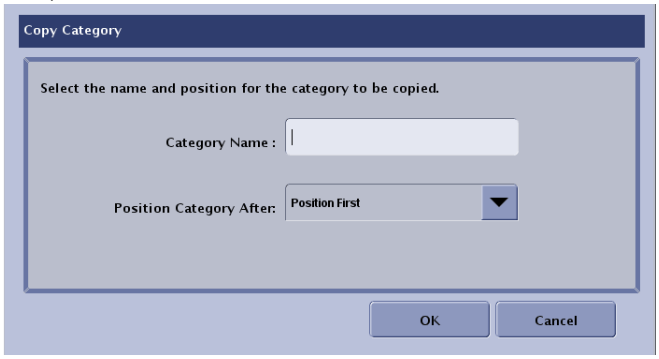
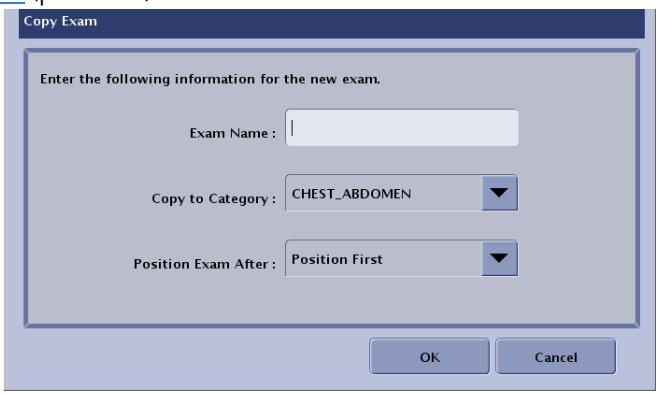
6. Continue with Copy Exam (p. 10-51).



Copy Exam

1. Select the Exam to copy.
2. Press [COPY EXAM].
3. Enter the new name to use or retype the existing name.
4. Select the **Category** to copy to.
5. Select the position on the **Exam** list.
6. Press [OK].
7. Continue with Copy View (p. 10-51).



Copy View

1. Select the View to copy.
2. Press [COPY VIEW].
3. Enter the **Exam Name** to use or retype the existing name.
4. Select the **Copy to Category** from the list.
5. Select the **Copy to Exam** from the list.
6. Select the **Position View** from the list.

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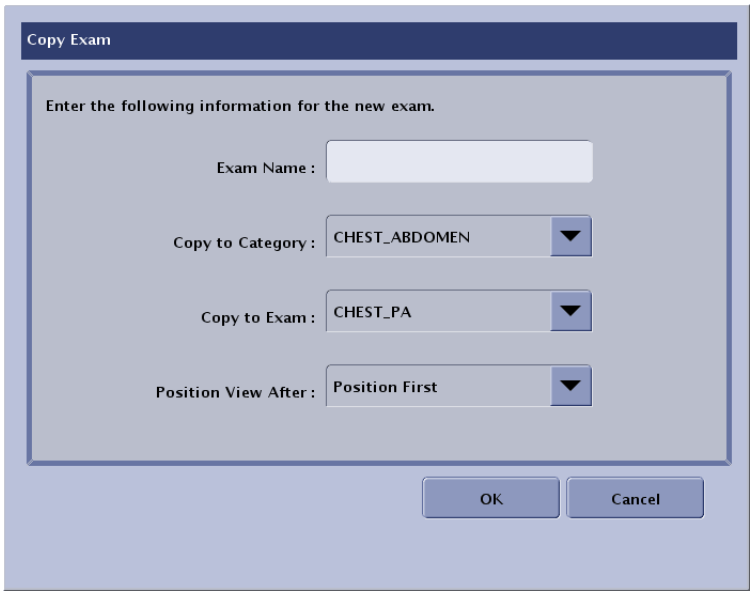
7. Press [OK].



NOTE: Remember to back up the database when finished editing. Refer to Backup Protocol Database to CD (p. 10-41) for more information.

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Chapter 11: Quality Assurance Process and Maintenance

This chapter explains the Quality Assurance and Maintenance process for the system. To assure continued performance of the system, a periodic inspection program must be established. Daily functional checks should be part of this program.

The Quality Assurance Process (QAP) consists of a series of tests that should be performed weekly on your system to quantify image quality. Many of the background tasks in this procedure have been automated and require the acquisitions to be performed in the prescribed order.

Topics covered include:

- Types of Quality Tests (p. 11-1)
- When to Perform Quality Tests (p. 11-2)
- Quality Test Preparation (p. 11-2)
- Perform Detector Check (p. 11-2)
- Perform QAP (p. 11-5)
- Result History (p. 11-10)
- Maintenance and Cleaning (p. 11-11)

Types of Quality Tests

There are two types of quality tests:

- Detector Check: A quick test to check detector quality. Detector Check does not require making exposures and the pass or fail results are not included in the results history. The Detector Check test can be performed in approximately 30 seconds.
- QAP: A full QAP test that requires taking exposures of a flat field phantom. The results (pass or fail) are recorded in a results history summary for service personnel review. The QAP test can be performed in approximately 15 minutes.

  The QAP test includes all the tests that are performed for Detector Check and tests additional factors.

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When to Perform Quality Tests

QAP should be performed:

- On a scheduled, weekly basis.
- When the alert icon appears on the QAP button (Figure 11-1).
- When there is a perceived loss of image quality.

NOTE: When scheduling QAP tests, plan 15-20 minutes to perform the test. One portion of the test requires that the system be powered on and in an idle state (i.e., without exposures) for at least 10 minutes. The 10 minute idle period is based upon the time from the last exposure prior to performing QAP or system start up. The rest of the test requires approximately 5 minutes to complete.

Figure 11-1 QAP button with alert icon

Quality Test Preparation

Before starting quality tests, be sure to do the following:

- Close or suspend any open exams
- Close any exam being reviewed
- Clear all objects from detector and beam path (QAP only)

The QAP process begins when the QAP button is clicked. The button is located at the bottom of the Worklist or Acquisition screen.

NOTE: QAP cannot be performed if an exam is open or being reviewed.

Perform Detector Check

Follow this process to perform a Detector Check.

1. Press the [QAP] button at the bottom of the Worklist or Acquisition screen.
   - The Image Quality screen appears.

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Figure 11-2 Image Quality screen

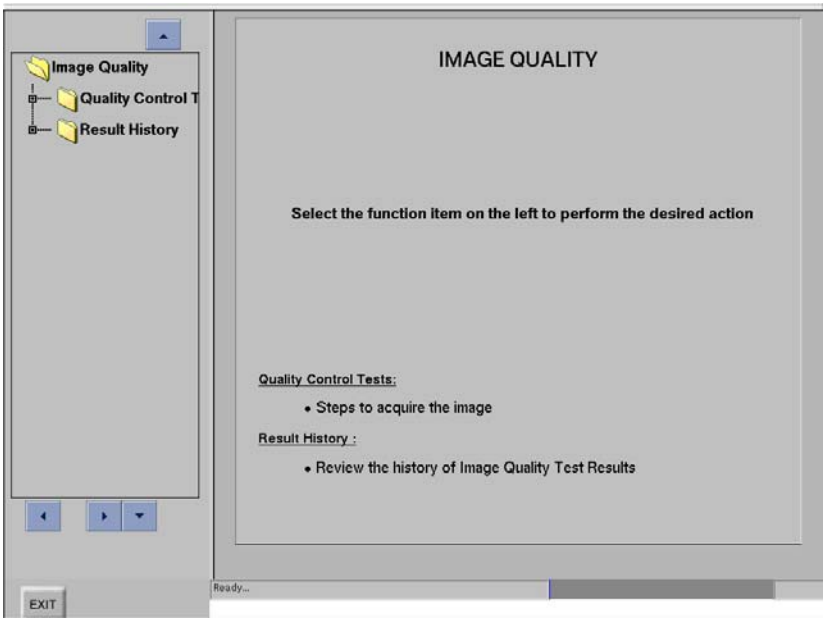


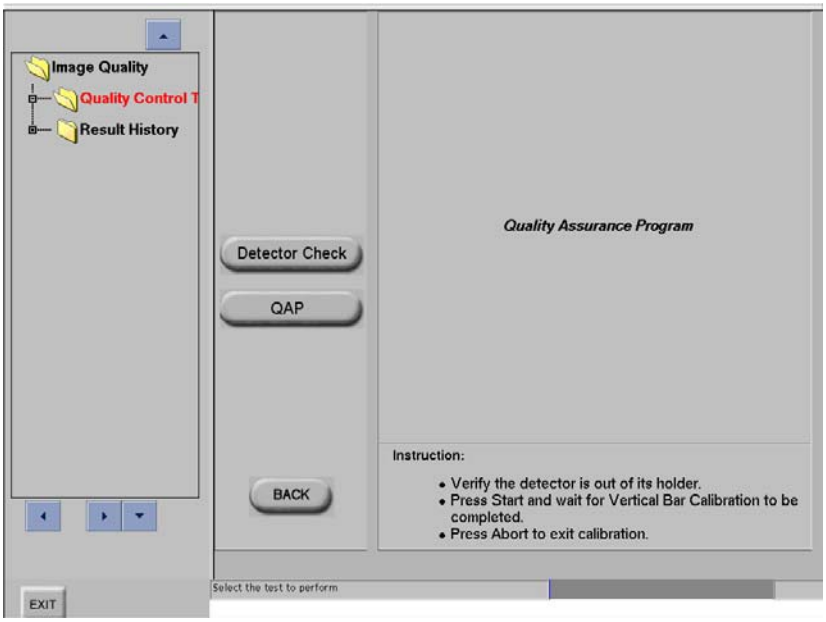
Image Quality
Quality Control T
Result History
IMAGE QUALITY
Select the function item on the left to perform the desired action
Quality Control Tests:
• Steps to acquire the image
Result History :
• Review the history of Image Quality Test Results
EXIT
Ready...

2. Select **Quality Control Tests** from the left side of the screen (Figure 11-3).

Figure 11-3 QAP selection from left side of screen

- The Quality Assurance Program screen appears.

Figure 11-4 Quality Assurance Program screen



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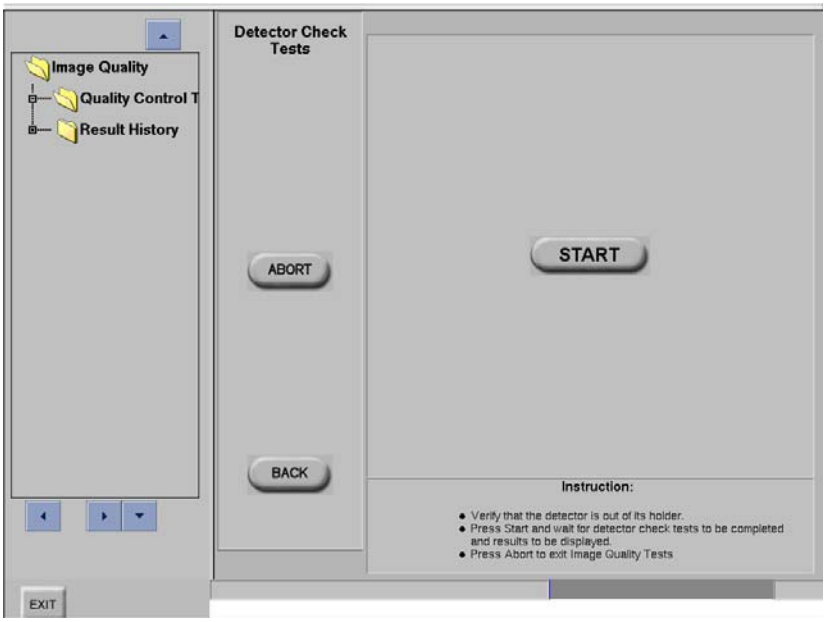
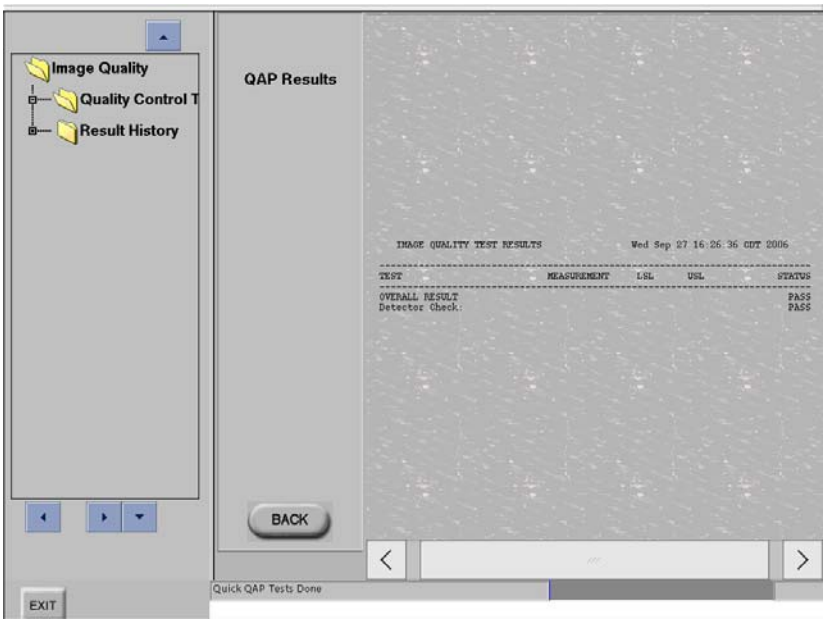
3. Press [DETECTOR CHECK].
   - The Detector Check Tests screen appears.

Figure 11-5 Detector Check Tests screen



4. Press [START] to begin the Detector Check.
5. Wait for the test to complete.
   - The Detector Check result screen appears automatically after tests have been completed.

Figure 11-6 Detector Check results screen



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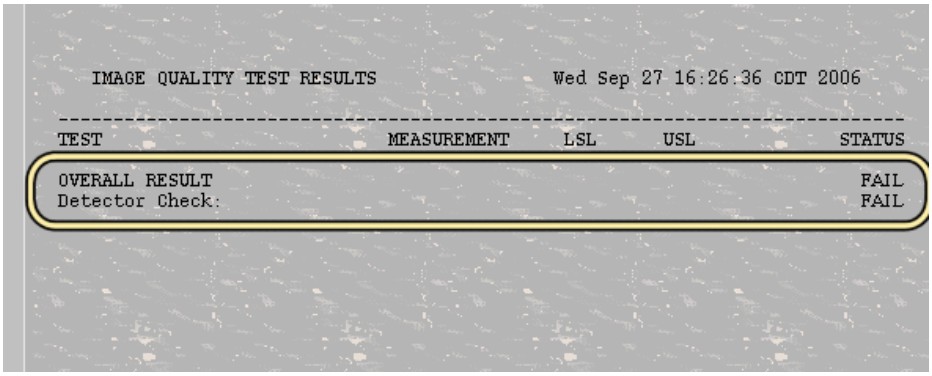
Failed Detector Check

If the system fails the Detector Check (Figure 11-7), call to schedule service. The system is operational, although inspection and potential calibration are needed.

WARNING: Image quality may be degraded if you continue to use a detector that has failed the Detector Check tests.

Figure 11-7 Failed Detector Check results



Perform QAP

QAP involves tests requiring exposures with the flat field phantom. The Definium 5000 QAP kit includes a flat-field phantom (Figure 11-8) sized to fit the collimator.

QAP tests require that the system be on **and** idle for at least 10 minutes.

Figure 11-8 Flat-field phantom

Follow this process to perform a QAP test.

1. Press the [QAP] button at the bottom of the Worklist or Acquisition screen.
   - The Image Quality screen appears.

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Figure 11-9 Image Quality screen

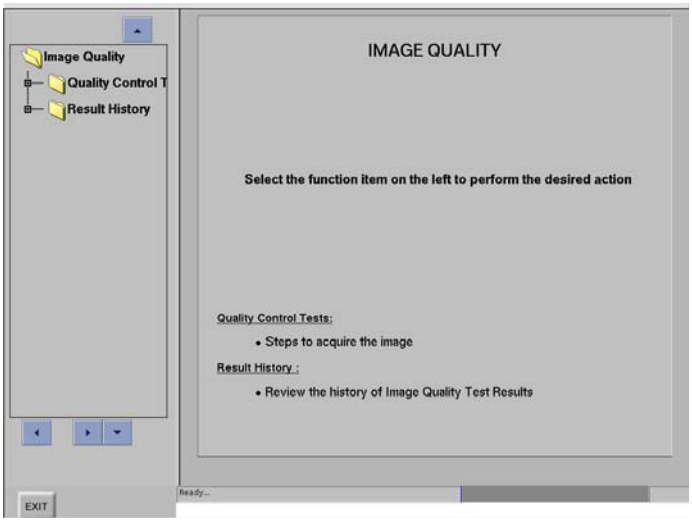


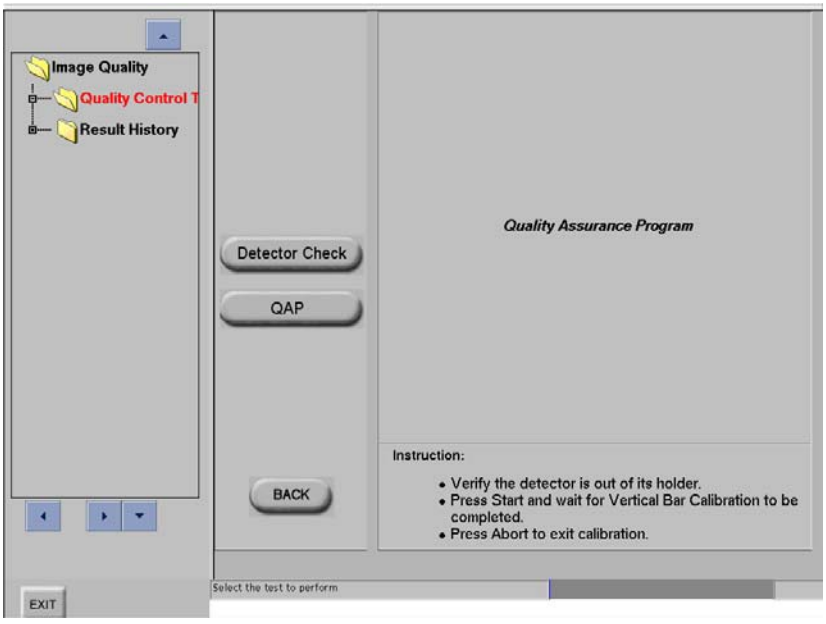
Image Quality
Quality Control T
Result History
IMAGE QUALITY
Select the function item on the left to perform the desired action
Quality Control Tests:
• Steps to acquire the image
Result History :
• Review the history of Image Quality Test Results
EXIT

2. Select **Quality Control Tests** from the left side of the screen (Figure 11-10).

Figure 11-10 QAP selection from left side of screen

- The Quality Assurance Program screen appears.

Figure 11-11 Quality Assurance Program screen



3. Press [QAP].

- The Vertical Bar Calibration screen appears.

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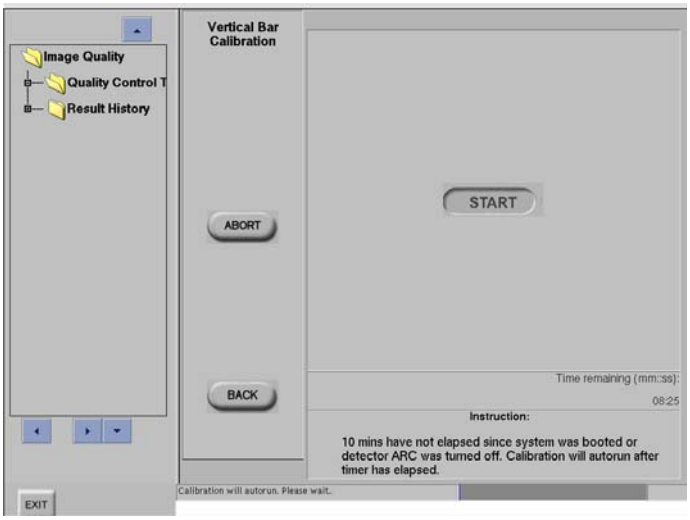
4. Press the [START] button to begin the Vertical Bar Calibration test.

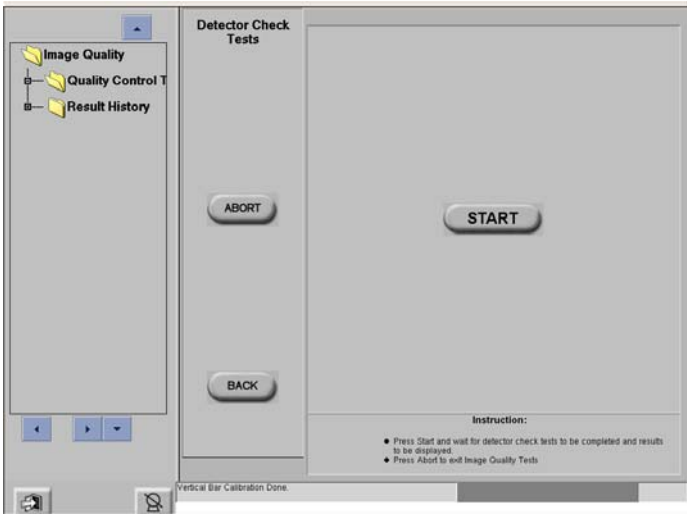
NOTE: QAP requires that the system be in an idle state (without exposures) for at least 10 minutes before the Vertical Bar Calibration portion of the test can begin. If the system has not been idle, a countdown timer appears on the bottom of the screen and Vertical Bar Calibration will begin automatically when the specified time has been reached.

Figure 11-12 Vertical Bar Calibration screen



5. Wait for the test to complete.
   - The Detector Check Tests screen appears.
6. Follow the instructions on screen to complete this portion of the test:

Figure 11-13 Detector Check Tests screen



   a) Press [START] and wait for the detector check tests to be completed and results to be displayed.
   - The Detector QC Tests screen appears automatically when the Detector Check Tests are complete.
7. Follow the instructions on screen to complete this portion of the test:

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Figure 11-14 Detector QC Tests screen

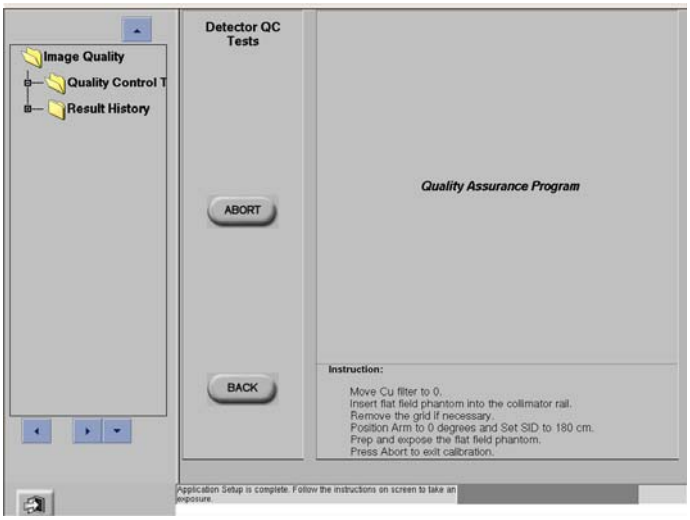
Image Quality
Quality Control T
Result History
Detector QC Tests
ABORT
BACK
Quality Assurance Program
Instruction:
Move Cu filter to 0.
Insert flat field phantom into the collimator rail.
Remove the grid if necessary.
Position Arm to 0 degrees and Set SID to 180 cm.
Prep and expose the flat field phantom.
Press Abort to exit calibration.

a) Move Cu filter to 0 (if equipped).

b) Insert flat field phantom into the collimator rail.

c) Remove the grid if necessary.

d) Position arm to 0 degrees.

e) Set SID to 180 cm.

f) Prep and expose the flat field phantom.

- The Detector QC Tests screen updates to show a [START] button.

8. Press [START] to begin Flat-field Tests.
   - The Flat-field tests screen appears.
9. Follow the instructions on screen to complete this portion of the test:
   a) Do not reposition the system.
   b) Prep and expose the flat field phantom.
   - The acquired preview image automatically appears after exposure.
10. Press anywhere on the screen to close the Preview and return to the QAP screen.
11. Prep and expose the flat field phantom again.
    - The acquired preview image automatically appears after exposure.
12. Press anywhere on the screen to close the Preview and return to the QAP screen.
    - The QAP result screen (Figure 11-15) appears automatically after tests have been completed.
13. Review the Status (far right column) of each test.
    - If all tests PASS: QAP is complete. Click [EXIT] to return to the Worklist screen and continue work.
    - If some tests FAIL: Refer to Failed QAP (p. 11-9) for more information.

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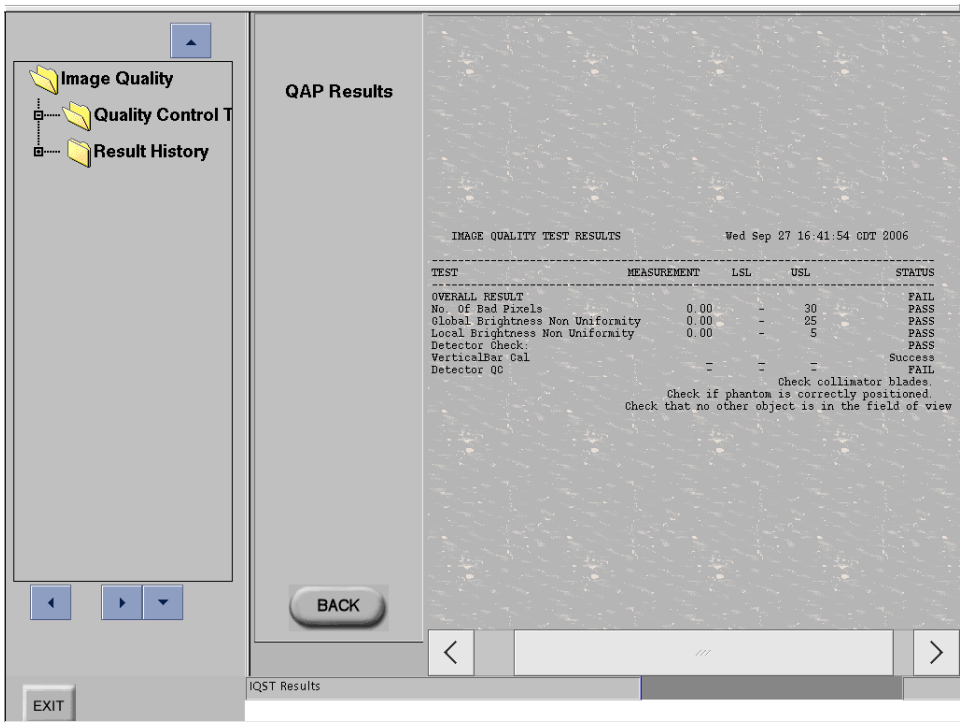
Figure 11-15 QAP Results screen



Failed QAP

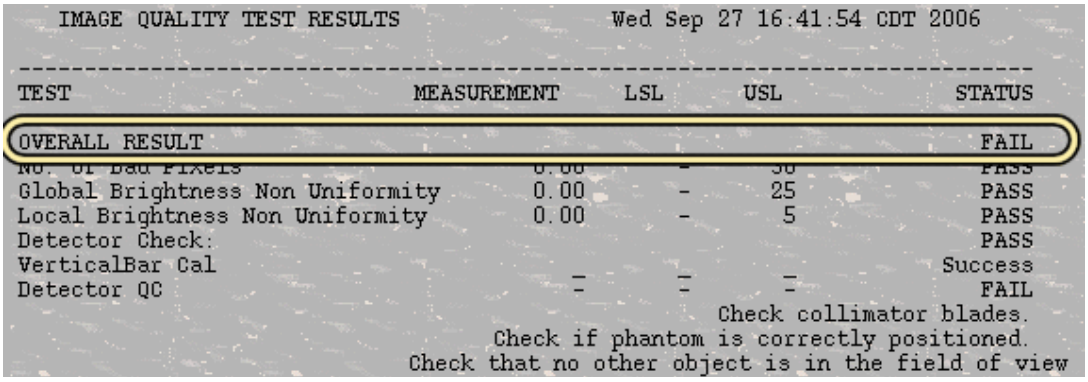
In the event of failed QAP tests, wait 10 minutes and repeat the QAP procedure to confirm the failure. Check the items listed below when repeating the tests:

- Check collimator blades. Make sure that they are fully open and not in the field of view.
- Check that the phantom is correctly positioned.
- Check that no other objects are in the field of view.

If a single failure is confirmed, call to schedule service. The system is operational, although inspection and potential calibration are needed.

If multiple failures are confirmed, image quality may be affected; cease use of the unit and call for immediate service.

Figure 11-16 Failed QAP results



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Result History

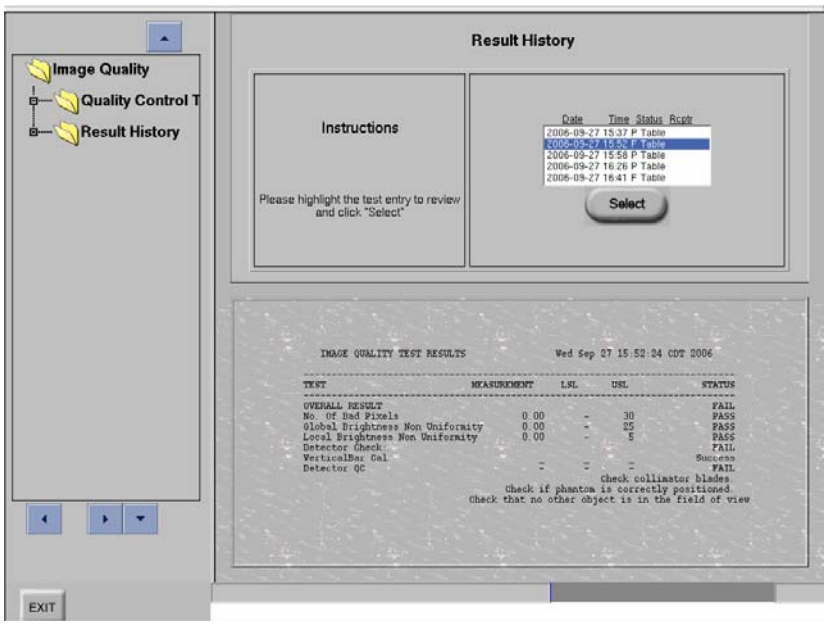
After QAP is complete, the system generates a test summary page. The result summary table contains descriptive names, measured values, test specifications (LSL and/or USL) and pass/fail status.

A minimum of 25 QAP test results are maintained.

Follow this process to view the results of previous QAP tests.

1. From the left pane, press [RESULT HISTORY].
   - The Result History screen appears.
2. Press a test entry in the list to select it.
3. Press [SELECT].
   - The test details appear.

Figure 11-17 QAP Result History screen



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Maintenance and Cleaning

DANGER: Do not remove any cover, disassemble or manipulate internal components in the unit. These actions could cause serious personal injuries and / or equipment damage.

WARNING: Never attempt to clean any part of the unit when it is switched on. always switch off the equipment and isolate the mains electrical supply before cleaning.

Service Tasks

Only service personnel specifically trained on this medical X-ray equipment should work on service tasks or maintenance of the equipment.

The Service Preventative Maintenance Schedule can be found in the Definium 5000 Manual Direction 5192970-100, Chapter 7.

In order to ensure continued safe performance of the equipment, a periodic maintenance program must be established. It is the owner's responsibility to supply or arrange for this service.

There are two levels of maintenance, the first consists of tasks which are performed by the user/operator, and the second are those tasks to be performed by qualified X-ray service personnel.

The first periodic maintenance service should be performed six (6) months after installation, and the subsequent services at twelve (12) month intervals.

The manufacturer undertakes to have available spare parts for this equipment at least for five (5) years after the unit manufacturing.

Operator Tasks

The tasks of this periodic maintenance shall include the following items:

1. Switch the generator OFF.
2. Externally, check the proper cable connections between each major component in the X-ray system (Power Cabinet, Consoles, etc.).
3. Clean the equipment frequently, particularly if corroding chemicals are present. Clean external covers and surfaces, specially parts in contact with patients, with a cloth moistened in warm water with mild soap. Wipe with a cloth moistened in clean water. Do not use cleaners or solvents of any kind.

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Cleaning and Disinfecting

This equipment should be cleaned frequently, particularly if corroding chemicals are present. Use a cloth moistened in warm soapy water (use mild soap) to clean the trim and nameplate of the Operator's Controls. Wipe with a cloth moistened in clean water.

Do not use cleaners or solvents of any kind as they may dull the finish or blur the lettering. Polish with a pure liquid or paste wax. Other surfaces of the equipment can be cleaned using a clean cloth moistened slightly with a good mild cleaner and polish acceptable for use on enameled metal surfaces. Before each use, equipment surfaces that contact the patient should be cleaned with an EPA registered, low-level disinfection or sanitizing agent.

CAUTION: In the event of equipment contacting broken skin or being used with infected or immune compromised patients, the equipment should be cleaned using EPA cleared and EPA registered high-level disinfecting agents.

NOTE: Be sure to follow the label instructions and pre-cautions for use, storage, and disposal of all disinfecting agents.

NOTE: Clean the surface of the PC with a damp cloth.

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Appendix A: Image Pasting

Topics covered include:

- Overview (p. A-2)
- Image Pasting Patient Positioner (p. A-3)
  - Lock Positioner in Place (p. A-3)
  - Move Lateral Positioning Bars (p. A-5)
- Image Pasting Acquisition (p. A-5)
- Image Viewer (p. A-8)
  - Paste Images (Create Composite Image) (p. A-8)
  - Correct Pasting (p. A-10)
  - Add New Images to Pasted Composite (p. A-12)
  - Select Images (p. A-12)
  - View Pasted Composite Image (p. A-13)
  - Re-process Images (p. A-13)
  - Change Looks Processing (Vertical Equalization) (p. A-14)
  - Print Pasted Images (p. A-15)
- Image Pasting Preferences (p. A-15)
  - Add or Edit Image Pasting Protocols (p. A-15)
  - Edit Image Processing (p. A-16)

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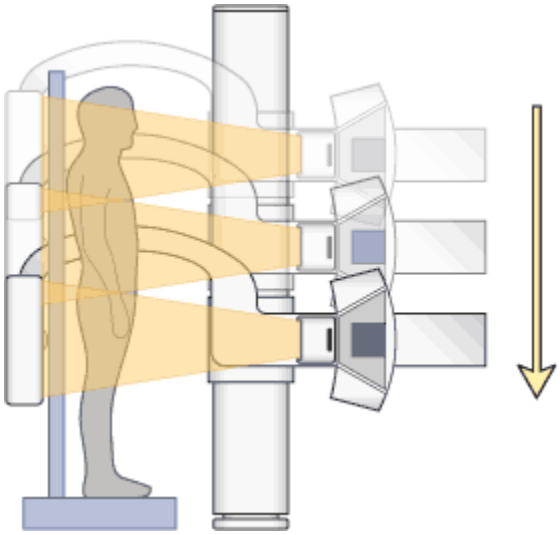
Overview

Image Pasting allows x-ray imaging of patient anatomy, such as spine and legs, that are larger than the detector's 41cm field of view. Previously, in film or CR, this was accomplished by the use of a "long" cassette.

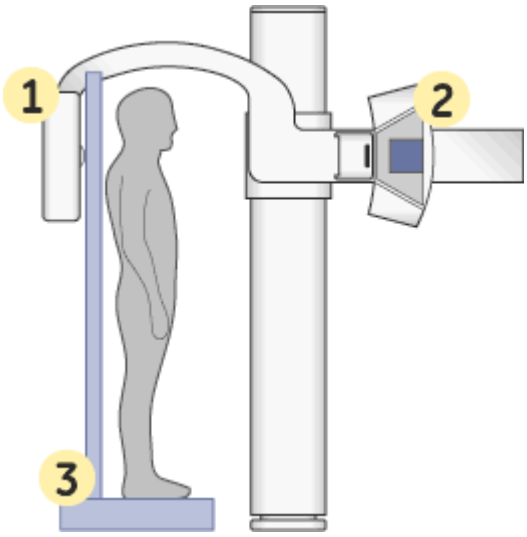
The Definium 5000 digitally pastes 2-5 overlapping exposures together to form a single image.

Figure A-1 Illustration of acquisition



The arrow indicates the progress of tube movement as images are acquired.

Figure A-2 Overall setup for image pasting



1. Receptor Assembly
2. X-ray Tube Assembly
3. Patient Positioner

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Image Pasting Patient Positioner

The patient positioner (Figure A-3) is used to accurately re-construct images.

NOTE: The maximum weight the patient positioner can support is 204kg (450 lbs.).

Figure A-3 Patient positioner

1. Lateral positioning bars
2. Mylar backing
3. Floor locks (one on each side)
4. Riser

Lock Positioner in Place

The positioner locks into place in front of the wall stand receptor. Locking the positioner ensures that it is at the appropriate distance from the receptor, that it will not move during acquisition, and that the patient does not fall.

CAUTION: Lock both sides of the positioner before allowing the patient to stand on the riser. The positioner could move and cause the patient to fall.

CAUTION: The receiving holes in the floor may collect debris or catch the heel of a shoe. Use the provided plugs (Figure A-4) to fill the receiving holes when the positioner is not in use.

Figure A-4 Floor plug

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1. Align positioner with the receiving holes in the floor.

Figure A-5 Positioner and receiving hole

2. Push the lock lever down so that the pin goes into the hole (Figure A-6).

Figure A-6 Lock lever pushed down

3. Push the back of the lock lever down to lock (Figure A-7).

Figure A-7 Lever in locked position

4. Lock the other side.

NOTE: When the positioner is not being used, unlock one side and rotate the positioner out of the way. This will save you time and space for storing the positioner.

5. Unlock the positioner by pressing the front of the lock lever down (so that it is horizontal, as show in Figure A-6) and letting the lever rise up.

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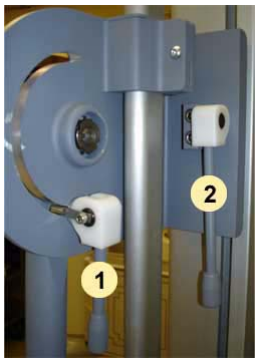
Move Lateral Positioning Bars

There are two locks on the back of the lateral positioning bars (Figure A-8): to rotate the bar and to adjust the vertical placement.

Figure A-8 Lateral Positioning Bar locks



1. Rotation lock lever
2. Vertical adjustment lock lever

1. Pull the lock lever 90° from its locking position (Figure A-9).

Figure A-9 Levers in the unlocked position

Rotation

Vertical adjustment

2. Move the lateral positioning bar to the desired height or rotation.
3. Place lock lever back into the locked position (Figure A-8).

Image Pasting Acquisition

Image Pasting is only used in the upright exam position.

Follow this process to conduct an Image Pasting exam.

1. Move the unit into position for an upright exam, if necessary.
2. Place the patient positioner in front of the wall stand and secure the floor locking mechanism. Refer to Lock Positioner in Place (p. A-3) for more information.
3. Select the patient from the Worklist (or add patient if necessary).

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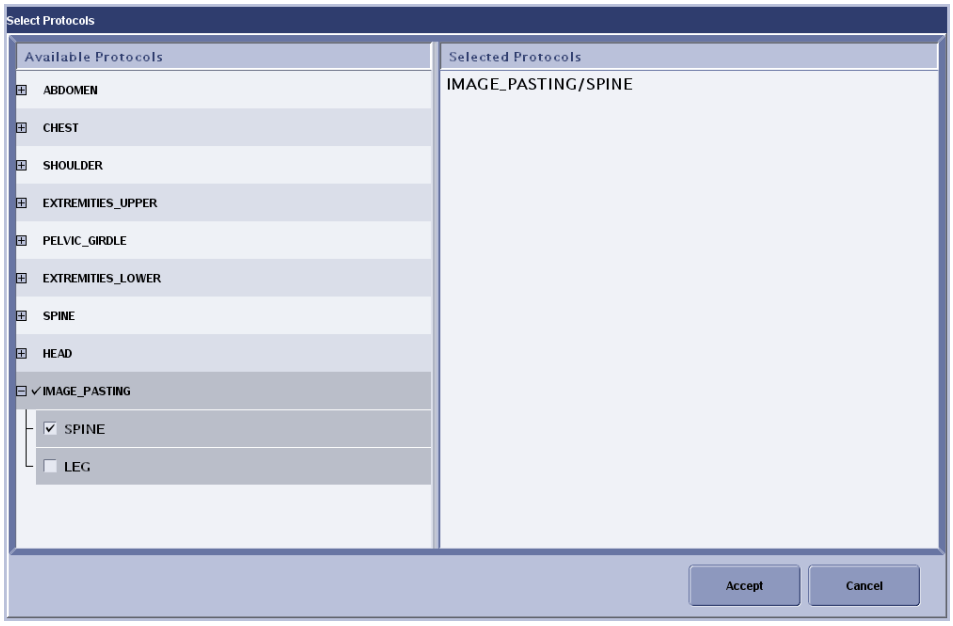
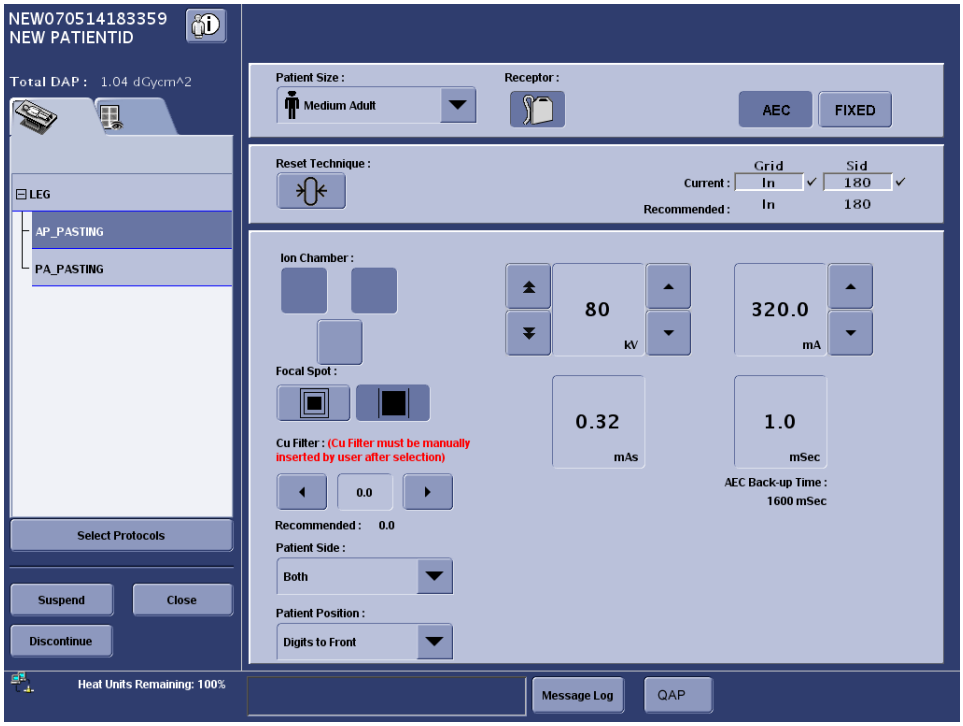
4. Select the Image Pasting protocol from the Select Protocols screen (Figure A-10).
   a) Select the Image Pasting category.
   b) Select the Exam (Spine or Leg).
5. Click [ACCEPT].

Figure A-10 Protocol selection for Image Pasting



6. On the Acquisition screen (Figure A-11), select the view to perform.

Figure A-11 Acquisition screen for image pasting



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7. Select the **Patient Size**.
8. Adjust the technique on the Acquisition screen as appropriate.

NOTE: Settings are applied to all acquired images.

- The [RESET TECHNIQUE] button resets to default technique for selected application.

9. Position the tube at the appropriate SID.
10. Stand the patient in front of the patient positioner.
11. Instruct the patient to close his or her eyes.
12. Turn on the collimator light.

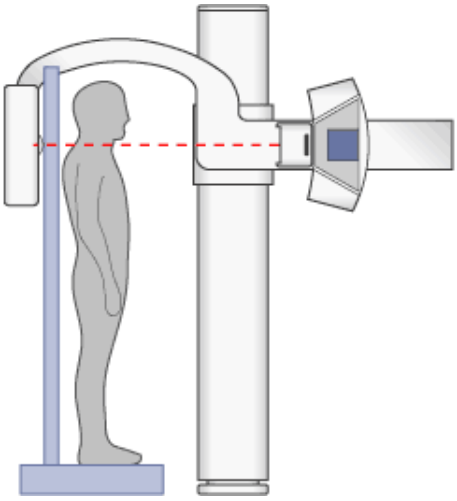
WARNING: **Do NOT stare into beam! When you switch on the collimator laser light, make sure no person looks directly into the laser to avoid eye injuries or impaired vision.**

13. Adjust the lateral collimation.

NOTE: Image Pasting registration can cause narrowing of the field. Do not collimate in too tightly.

14. Adjust the arm height so that the FOV light covers the desired anatomy (Figure A-12).

Figure A-12 Arm positioned at top of anatomy



15. Make the exposure using the hand switch.

- The Acquisition Workstation screen changes to show the Image Viewer screen.

16. Use the screen switch tab to go back to the Image Acquisition screen.

Figure A-13 Screen switch tab

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17. Re-position the arm to acquire the next image.

IMPORTANT!: Make sure that each exposure overlaps the previous exposure area by 7cm (2.75 in).

18. Repeat steps 15 - 17 until you reach the bottom of the desired anatomy (Figure A-14).

Figure A-14 Arm positioned at bottom of anatomy

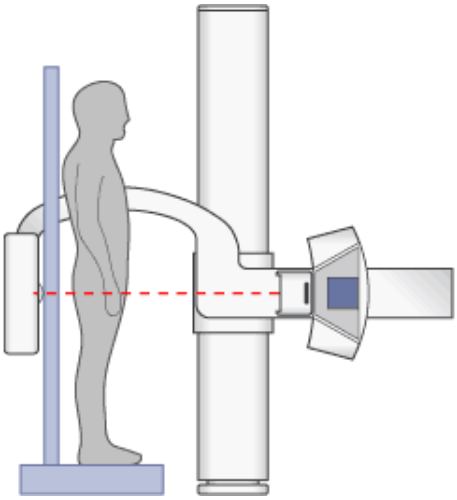

Image Viewer

Each acquired image is a "sub-image." The system aligns and pastes the sub-images into a single "composite" image. The pasted composite is one long image that has continuous anatomical content with the same processing applied throughout.

The following images are stored for the exam and are available for viewing:

- The acquired raw sub-images in the "RAW" series
- The processed sub-images in the "PROC" series (1 processed image for each raw image)
- Any re-processed sub-images and pasted sub-images and pasted composite images in the "PROC" series

All image zoom, annotation, adjustment tools (brightness, contrast, windowing, rotation, etc.), and re-processing are available for the pasted composite image and the sub-images. The controls function the same as for non-pasting acquisitions. Refer to Chapter 8: Image Viewer for more information about image adjustment.

The pasted composite image is treated as one image entirely. Image adjustments are applied equally to the entire pasted composite image.

NOTE: DEI is not shown for pasted composite images.

Paste Images (Create Composite Image)

You create pasted composite images after image acquisition is complete by pressing the [PASTE] button on the Reprocessing palette (Figure A-15).

NOTE: You can paste images together even if one image from the sequence has been deleted.

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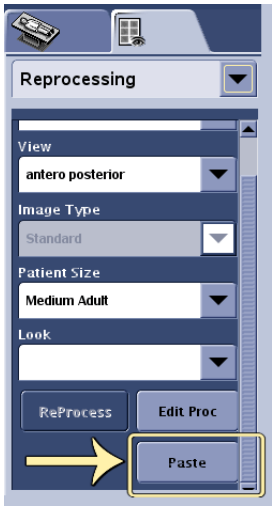
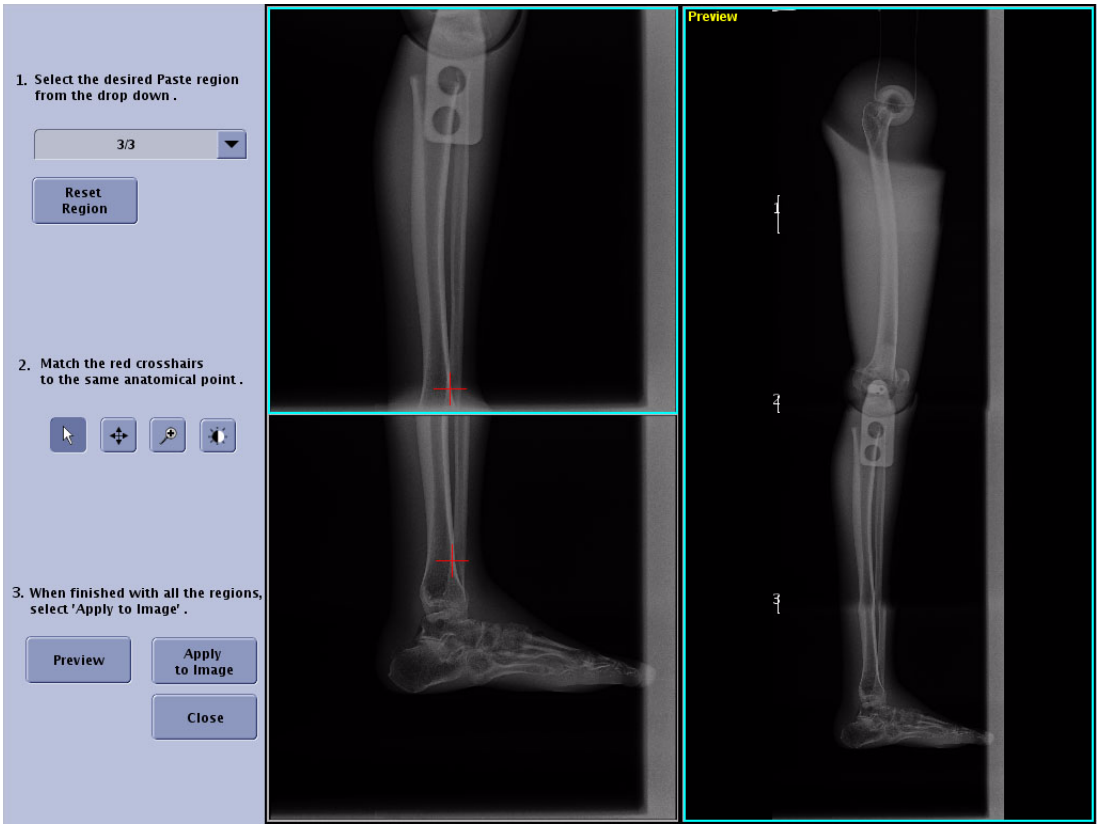
NOTE: If performing more than one projection or series, you must perform these projections in separate exams. To do this, complete your first projection, close the exam, reselect the patient from the worklist, select Start Exam and select Append Exam on the pop-up screen to perform the second paste exam.

Figure A-15 [PASTE] button on Reprocessing palette



The Pasting screen (Figure A-16) shows two sets of images. The left half shows the selected pasting region (the overlapped area between 2 sub-images). The left half is also the work area where you set the alignment. The right half shows a preview of the pasted image.

Figure A-16 Pasting screen


1. Select the desired Paste region from the drop down .
3/3
Reset Region
2. Match the red crosshairs to the same anatomical point .
3. When finished with all the regions, select 'Apply to Image' .
Preview
Apply to Image
Close
Preview

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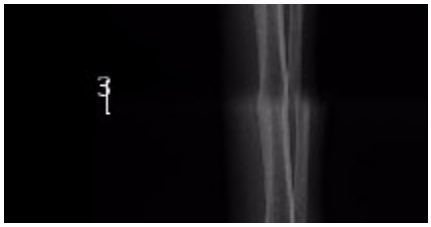
The registration markers (brackets) show the general area of pasted overlap (Figure A-17). Use the Image Magnifying Glass function to review registration quality.

Figure A-17 Close-up of registration marker and mis-registered area



Follow this process to paste images.

1. From the tool selection list, select Reprocessing.
2. Press the [PASTE] button.

NOTE: It may take a few moments for images to appear.

3. Review the pasted image.
   - If the image is satisfactory, press [APPLY TO IMAGE] to save the composite and return to the main Image Viewer screen.
   - If the pasted image is not satisfactory, follow the steps described in Correct Pasting (p. A-10) to make adjustments.

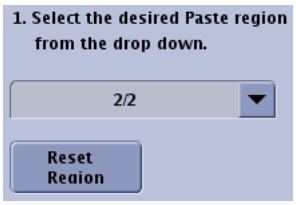
NOTE: The pasted composite will not be saved until [APPLY TO IMAGE] is pressed.

Correct Pasting

Follow this process to adjust a pasted image.

1. Select a region to re-paste from the drop-down list (Figure A-18). For example: 1/2, 2/2.
   - [RESET REGION] removes any adjustment from the selected region.

Figure A-18 Select region drop-down list.



2. Press and drag a red cross-hair to move it (Figure A-19).

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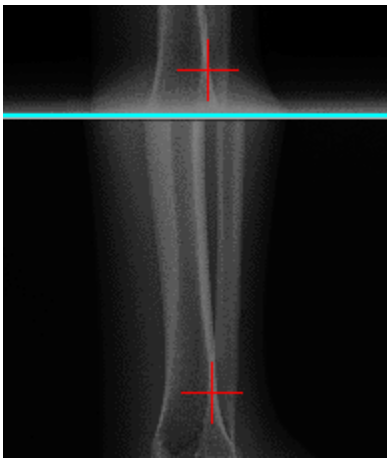
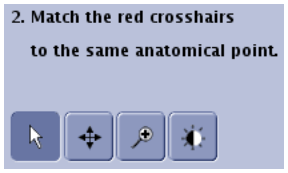
Figure A-19 Cross-hairs



3. Place the cross-hairs at the same anatomical reference point on each image.
   - The pointer control buttons (Figure A-20) change the action of the cursor when used on images. Refer to Chapter 8: Image Viewer-Change Pointer Controls (p. 8-21) for more information about these functions.
   - Use the Image Magnifying Glass on a region image to zoom in on anatomical regions for better cross-hair placement.

Figure A-20 Pointer controls



4. Repeat steps 1–3 for all regions, if necessary.
5. Click [PREVIEW] to check the registration (Figure A-21).

NOTE: Preview is only to check image alignment. Full image processing parameters are not applied to the preview.

NOTE: It may take several moments for the preview to appear on the right half of the screen.

Figure A-21 Preview and Apply to Image buttons

6. When satisfied with image alignment, press [APPLY TO IMAGE] (Figure A-21).

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NOTE: The pasted composite will not be saved until [APPLY TO IMAGE] is pressed.

- [APPLY TO IMAGE] initiates the system to perform the following tasks:
  - Apply the new registration and all processing
  - Re-process sub-images (creates new sub-images)
  - Create new pasted composite image
  - Add re-pasted images to the existing processed series
- You will automatically be returned to the main Image Viewer screen.

7. Press [CLOSE] to leave the pasting screen and return to the Image Viewer screen if you do not want to save the pasted composite

Add New Images to Pasted Composite

You may take additional exposures and create a new composite that contains the extra exposures. For example, if the original exposures of a leg exam did not extend to the ankle, additional exposures to cover the missed anatomy can be taken then added to a new composite image.

1. Take the additional exposures as described in Image Pasting Acquisition (p. A-5).
2. Create a new pasted composite as described in Paste Images (Create Composite Image) (p. A-8).
3. Adjust pasting, if necessary, as described in Correct Pasting (p. A-10).
4. Press [APPLY TO IMAGE] to save the composite.

NOTE: If performing more than one projection or series, you must perform these projections in separate exams. To do this, complete your first projection, close the exam, reselect the patient from the worklist, select Start Exam and select Append Exam on the pop-up screen to perform the second paste exam.

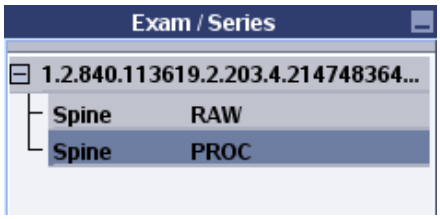
Select Images

The Exam/Series palette shows two kinds of series:

- Raw images – the individual sub-images that were acquired.
- Processed images – one processed image for each raw image plus the pasted composite image

Pasting adds 1 re-processed sub-image for every raw image and 1 pasted composite image to the same processed series.

Figure A-22 Exam/Series palette



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View Pasted Composite Image

The pasted composite image (Figure A-23) appears automatically after pasting is complete (after the [APPLY TO IMAGE] button is pressed).

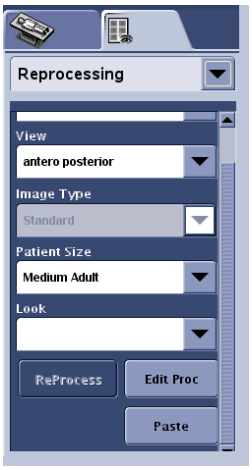
Figure A-23 Image Viewer screen with pasted composite image

Re-process Images

The Reprocessing palette (Figure A-24) contains the tools to re-process and re-paste sub-images and pasted images. Refer to Change Looks Processing (Vertical Equalization) (p. A-14) or more information.

Pasted composite images may be re-processed in the same manner as any other image. Refer to Chapter 8: Image Viewer-Re-process Images (p. 8-17) for more information.

Figure A-24 Reprocessing palette



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Change Looks Processing (Vertical Equalization)

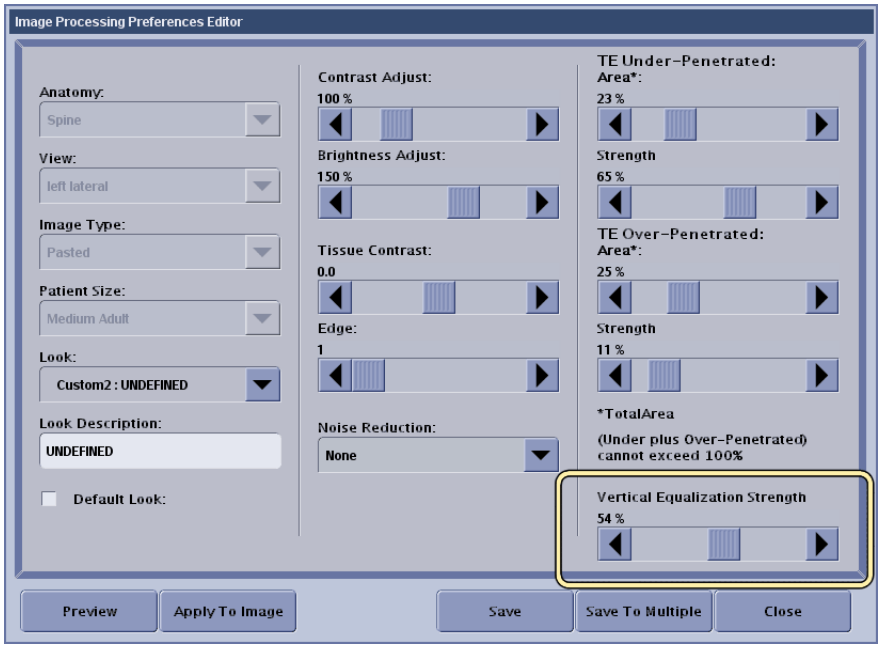
A custom look can be changed or applied through the Image Processing Preferences Editor screen.

Refer to Chapter 10: Set Preferences-Image Processing (p. 10-32) for more information about looks processing.

For Image Pasting acquisitions, the Image Processing Preferences Editor allows adjustment of vertical equalization strength.

1. Select the **Image Processing Tab** from the Image Tools palette.
2. Click [EDIT PROC].
   - The Image Processing Preferences Editor screen (Figure A-25) appears on the left monitor.
3. Select an undefined custom look from the **Look** drop-down.
4. Enter a name for the **Look Description**.
5. Adjust the parameters as described in Chapter 10: Set Preferences-Build Custom Looks (p. 10-33).
6. Adjust the **Vertical Equalization Strength**.
7. Click [PREVIEW] to see the effect of the changes.
   - The preview is shown on the Image Viewer screen.
   - Continue to adjust the look as necessary.
8. When satisfied with the looks processing, click [SAVE].
9. Click [APPLY TO IMAGE].
10. Click [CLOSE].

Figure A-25 Image Processing Preferences Editor screen



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Print Pasted Images

The process for printing images from an Image Pasting acquisition is the same as for standard images. Refer to Chapter 8: Image Viewer-Print Images (p. 8-22).

You have the option to preview before printing. If the print size of the pasted composite image is larger than can be printed on a single piece of film or paper, the preview will show multiple pages.

Image Pasting Preferences

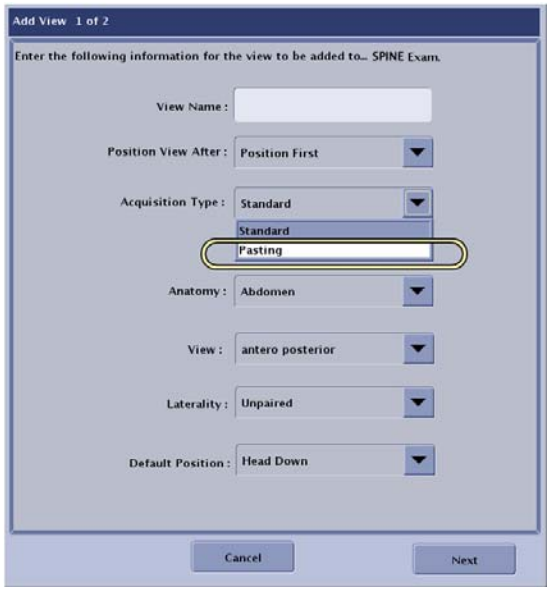
This section covers the preferences setting specific to Image Pasting. All other settings are as described in Chapter 10: Set Preferences.

Add or Edit Image Pasting Protocols

Protocol editing for image pasting (Figure A-26) is similar to standard exams except for the following differences:

- Select an **Acquisition Type** of **Pasting**

Figure A-26 Add View screen (1 of 2)



- There is no cassette receptor option.

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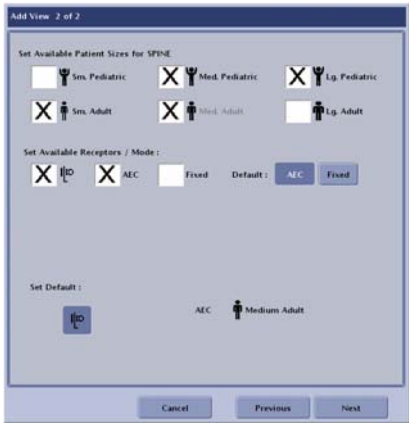
Figure A-27 Add View screen (2 of 2)



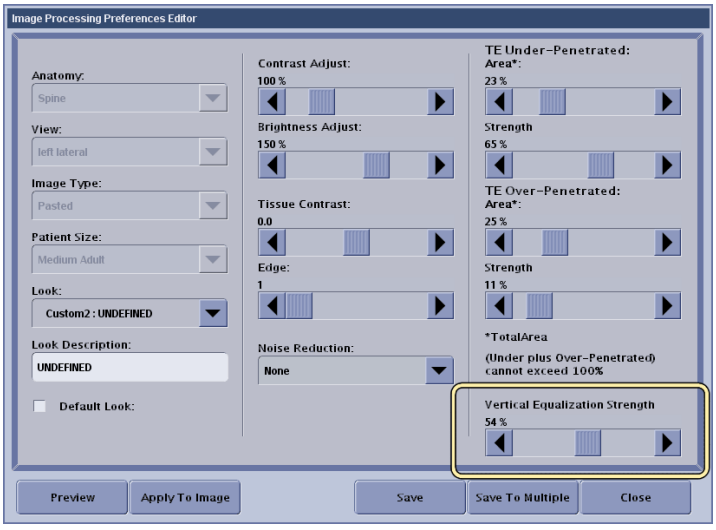
Edit Image Processing

The Image Processing editor allows you to select an **Image Type** of "Pasted" for specific anatomy and views.

- The Image Type "Pasted" is only available if one of the following **Anatomy** is selected:
  - Spine
  - Legs
- The only **Views** that allow image pasting processing are:
  - Spine: AP, PA, Left LAT, and Right LAT
  - Legs: AP and PA

The Vertical equalization strength slider appears (Figure A-28) if "Pasted" is selected for the Image Type.

Figure A-28 Image Processing Preferences Editor screen



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Appendix B: Login Administration

In the effort to provide aid for our customers in complying with the Health Insurance and Portability and Accountability Act (HIPAA), the Enterprise Access Authorization and Audit (EA3) control features have been implemented in this product. It is the facility's responsibility to ensure the proper usage of these features in order to conform to the Privacy Act.

Topics covered include:

- Enabling EA3 Login (p. B-1)
- Understanding Local and Enterprise Environments (p. B-2)
- Understanding Privileges, Groups, and Users (p. B-2)
- Administering Groups and Users (p. B-3)
  - Accessing the Login Administration Screens (p. B-3)
  - Working with Groups (p. B-4)
    - Add Groups (p. B-4)
    - Assign Privileges to Groups (p. B-5)
    - Remove Groups (p. B-5)
    - Show Protected Groups (p. B-5)
  - Working with Users (p. B-7)
    - Add Users (p. B-7)
    - Assign Users to Groups (p. B-8)
    - Change User Password (p. B-8)
    - Remove Users (p. B-9)
    - Show Protected Users (p. B-9)
- Viewing the Audit Log (p. B-11)
- Administering System Configuration (p. B-12)
  - Change Display Settings and Enable Enterprise Authorization (p. B-12)
  - Configure Enterprise Authorization (p. B-13)
  - Configure Audit Log (p. B-15)
  - Use LDAP Console (p. B-16)

Enabling EA3 Login

On the Service User Interface, click on the Configuration Tab and select the Advanced Options. Click on the Radio Buttons available to Enable/ Disable the HIPAA option. By default the HIPAA option is disabled.

The Login feature can be turned on or off by your GE Field Engineer.

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Understanding Local and Enterprise Environments

The login function may be administered at either a local or enterprise level.

Local (or stand-alone) login administration is for a piece of equipment or information system to have its own set of login names and passwords. Each local system needs to have users with admin access set up to administer the login function. From the user's perspective, he or she needs a login name and password for each piece of equipment and information system necessary to perform his or her job.

Enterprise login administration is to use the site's existing login names and passwords to allow access to multiple pieces of equipment and information systems throughout the site. The login function is administered centrally by the site's system administrator because each system sends and receives login information over the network. From the user's perspective, he or she only needs one login name and password to access all equipment and systems necessary to perform his or her job.

Understanding Privileges, Groups, and Users

Privileges are the rights to access a system or piece of equipment and perform certain functions. Privileges are assigned to groups. The privileges are created by GE and cannot be changed. They are:

- **GE Service** allows access to all functions for service and maintenance personnel.
- **Administrator** allows access to the Login administration and Preferences functions in addition to being able to add procedures to the Worklist, conduct exams, and manage images.
- **Standard and Limited User** only allows access to add procedures to the Worklist, conduct exams and manage images.

Groups are categories of users that have certain privileges assigned. Users get their privileges from groups. A user may be assigned to several groups. Groups are created and assigned privileges by a user with GE Service or Administrator access. If you do not have an enterprise system, the assignment of group privileges will probably be limited to those who have administrator privileges and those who don't. If your system is set up for enterprise login, your IT person or administrator will be using more of the features.

When equipment is installed in an enterprise environment, the administrator configures the enterprise groups that the equipment will use. That is, the enterprise environment will have groups for many levels of access and job descriptions, the administrator will set the individual piece of equipment to use a sub-set of those groups.

Users are individuals who have permission to use a particular system. Users are created and assigned to groups by a user with GE Service or Administrator access. These administrators may be IT personnel in an enterprise environment, or a site manager or lead tech in stand-alone environments. The administrator adds new users and assigns the users to a group which dictates the level of privileges a person will have. For example, a person named Sue Smith could belong to a group called technologists, radiologists, administrators, or any combination.

When configuring a system (enterprise or local) always create the groups and assign group privileges first, then add individual users to the groups.

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Administering Groups and Users

This section describes how to perform the tasks relating to administering the login function.

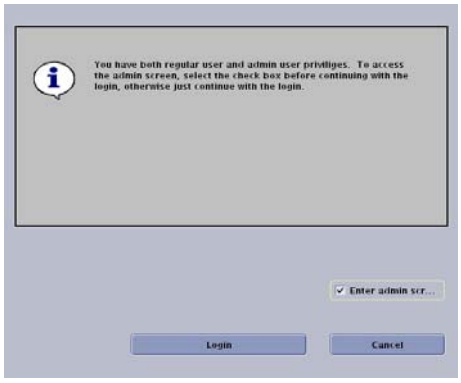
Accessing the Login Administration Screens

Follow this process to gain access to the login administration screens.

Follow this process to log on to the system.

1. Start up the system or log off the previous user.
   - The Login screen appears.
2. Type in your **Login Name**.
3. Type in your **Password**.
4. Click [LOGIN].
   - If you have administrator access, a message (Figure B-1) appears: "You have both regular user and admin user privileges. To access the admin screen, select the check box before continuing with the login, otherwise just continue with the login."
   - If the message does not appear, then you do not have access to the login administration functions.
5. Select the **Enter admin screen** checkbox.
6. Click [LOGIN].
   - The Login Administration screen appears.
   - [CANCEL] closes the message and returns you to the main Login screen.
7. Click [EXIT] on the bottom of any login administration screen to return to the standard login screen.

Figure B-1 Administrator access message


You have both regular user and admin user privilges. To access the admin screen, select the check box before continuing with the login, otherwise just continue with the login.
Enter admin scr...
Login
Cancel

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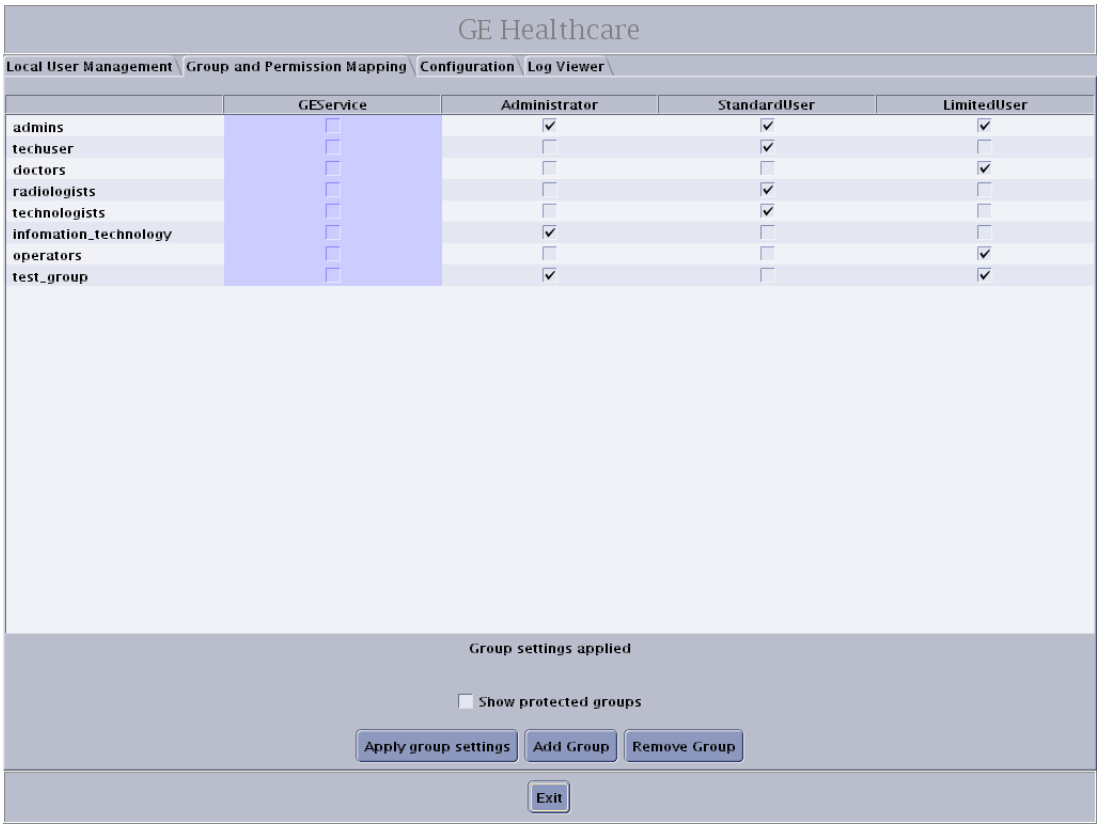
Working with Groups

The Group and Permissions Mapping tab (Figure B-2) allows you to add groups, remove groups, and assign privileges to groups. On this screen, the four privileges categories are at the top of the screen (columns) and the group names are at the left edge of the screen (rows).

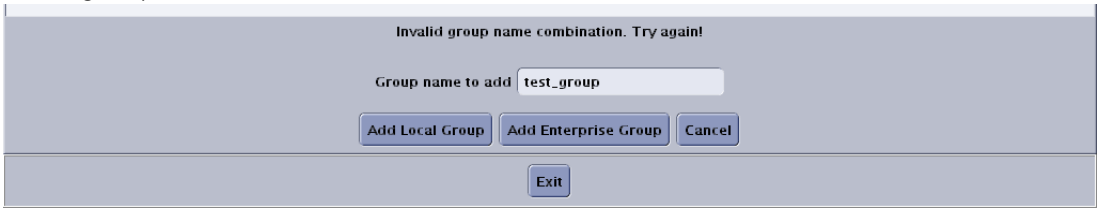
Figure B-2 Group and Permissions Mapping tab



Add Groups

1. Select the **Group and Permissions Mapping** tab, if necessary.
2. Click [ADD GROUP].
3. Type a name for the group in the text box that appears near the bottom of the screen (Figure B-3).

Figure B-3 Add group text box



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NOTE: Remember the following when creating group names:

- Group names cannot have spaces or uppercase (capital) letters. Use all lowercase letters in the group name and use underscores to separate words.
- The group name must be unique. That is, the system will not allow two groups to have the same name.

4. Click [ADD LOCAL GROUP] or [ADD ENTERPRISE GROUP] as appropriate.
   - The new group name is added to the table.
   - If the group name cannot be used you will receive a message that informs you of the problem. Type the correct information and click [SUBMIT] again.

Assign Privileges to Groups

1. Click a group name to select it.
2. Select the checkbox under the privilege heading. Refer to Understanding Privileges, Groups, and Users (p. B-2) for definitions of privileges.

NOTE: The Service privilege is protected and cannot be selected. Only GE Service personnel can assign a group to the Service privilege.

3. Click on a selected checkbox to remove the privilege.

NOTE: You may select or deselect privileges for multiple groups.

4. Click [APPLY GROUP SETTINGS].
   - A message appears: “Apply group settings.”
5. Click [APPLY NOW].

Remove Groups

1. Click a group name to select it.

NOTE: You are able to only delete one group at a time.

2. Click [REMOVE GROUP].
   - A message appears: “Remove Group (name)?”
3. Click [REMOVE NOW].

Show Protected Groups

There is a class of groups identified as protected groups. The privileges assigned to these groups can only be modified by a GE Service Engineer.

Select the **Show Protected Groups** checkbox to see these groups. Protected groups and privileges are shown with a violet (light purple) background.

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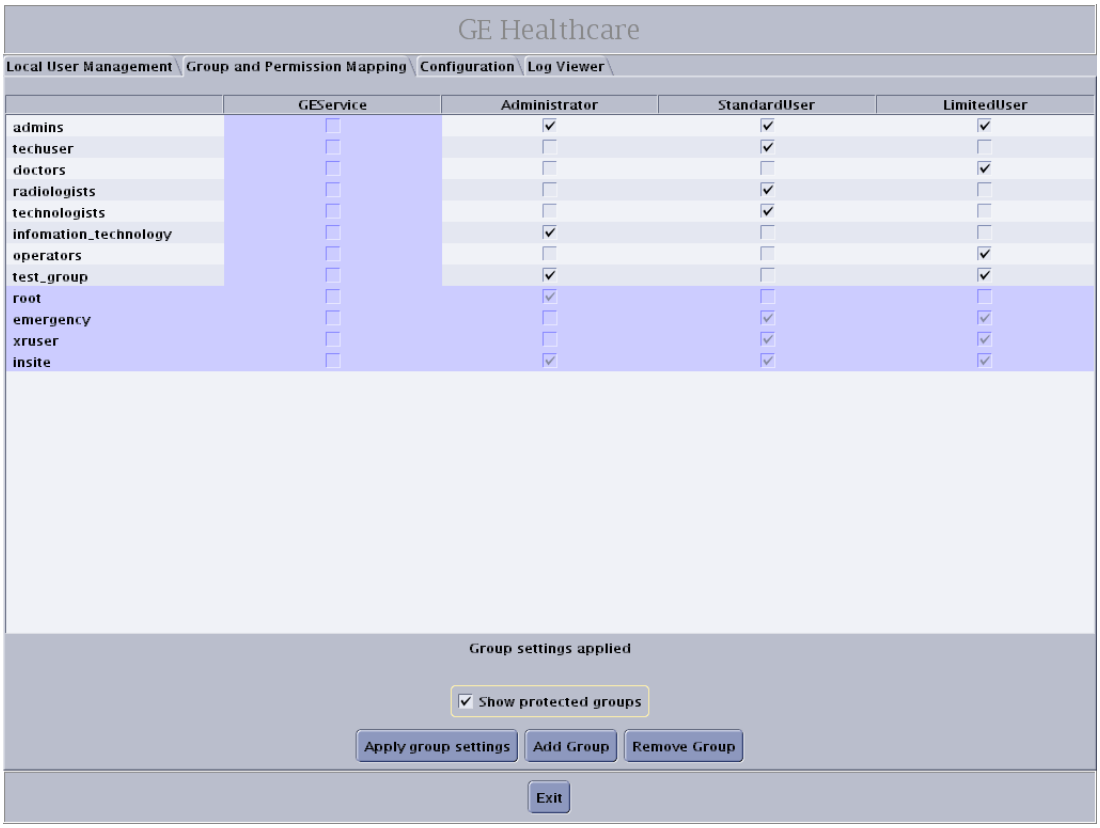
Figure B-4 Protected groups



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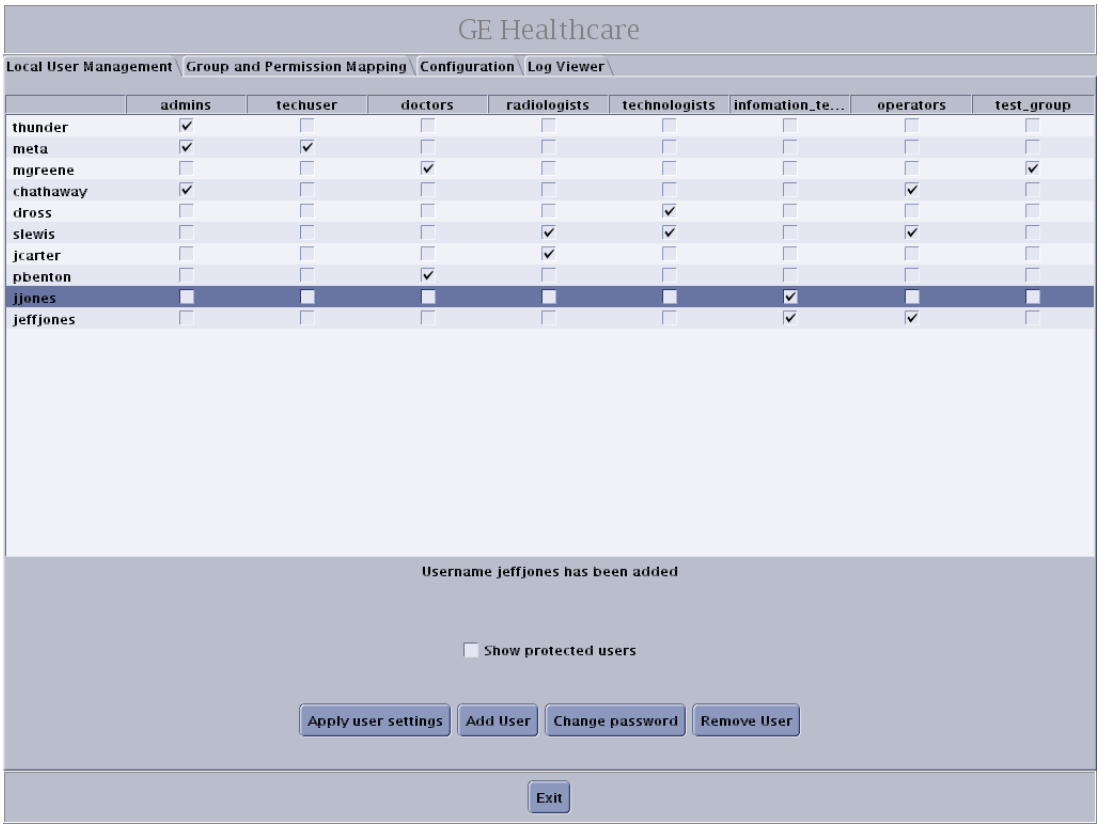
Working with Users

The Local User Management tab (Figure B-5) allows you to add users, assign users to groups, change user passwords, and remove users. On this screen, the available groups are at the top of the screen (columns) and the user names are on the left edge of the screen (rows).

Figure B-5 Local User Management tab



Add Users

1. Select the **Local User Management** tab, if necessary.
2. Click [ADD USER].
   - Five text boxes appear near the bottom of the screen (Figure B-6).

Figure B-6 Add user text boxes

3. Type a Username.

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NOTE: Remember the following when creating user names:

- You cannot use the names “operator”, “admin”, or “administrator.” These names are reserved for use by the system and GE Service personnel.
- User names cannot have spaces or uppercase (capital) letters. Use all lowercase letters in the username and use underscores to separate words.
- User names cannot have special characters: ~!@#%^&*()+=[]{}\|:;'",.<>/?
- The User name must be unique. That is, the system will not allow two people to have the same user name.

4. Type the user’s First Name.
   - This text box may be left blank but it is recommended that you type a name.

NOTE: Capital letters, spaces, and punctuation are allowed in the First Name and Last Name text boxes.

5. Type the user’s Last Name.
   - This text box may be left blank but it is recommended that you type a name.
6. Type a Password.

NOTE: The default system does not have pre-configured standards for password format or construction; however, your facility may have password standards that must be followed. Ask your facility’s System Administrator about password standards and create passwords that conform to those standards.

7. Re-type the password in the Confirm Password text box.

NOTE: The passwords must match exactly to be accepted.

8. Click [SUBMIT].
   - The new user is added to the table.
   - If the Username cannot be used or if the passwords do not match, you will receive a message that informs you of the problem. Type the correct information and click [SUBMIT] again.

Assign Users to Groups

1. Select the checkbox under the group heading to add the user to that group.
2. Click on a selected checkbox to remove the user from the group.

NOTE: You may select or deselect groups for multiple users.

NOTE: You cannot change the group assignments for protected users.

3. Click [APPLY USER SETTINGS].

Change User Password

You cannot see user’s passwords for security reasons. In the event of a forgotten password, you may change the password and then tell the user the new password.

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1. Click a user name to select it.
2. Click [CHANGE PASSWORD].
   - The Password and Change Password text boxes appear.

Figure B-7 Change password

3. Type a password into the New Password field.

NOTE: The default system does not have pre-configured standards for password format or construction; however, your facility may have password standards that must be followed. Ask your facility's System Administrator about password standards and create passwords that conform to those standards.

4. Re-type the password into the Confirm Password field.
5. Click [SUBMIT].

Remove Users

1. Click a user name to select it.

NOTE: You cannot delete protected users.

2. Click [REMOVE GROUP].
   - A message appears: "Remove User xxx?"
3. Click [REMOVE NOW].

Show Protected Users

There is a class of users identified as protected users. The privileges assigned to these users can only be modified by a GE Service Engineer.

Select the **Show Protected Users** checkbox to see these users. Protected users and groups are shown with a violet (light purple) background.

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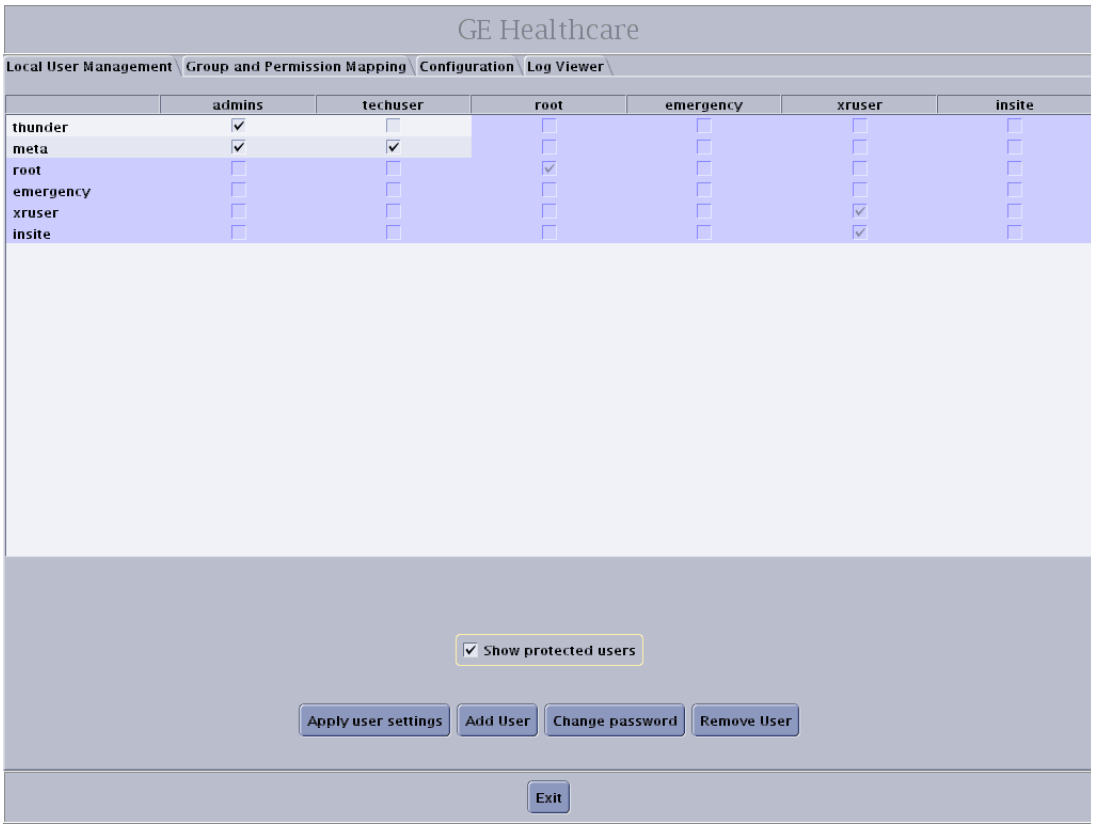
Figure B-8 Protected users



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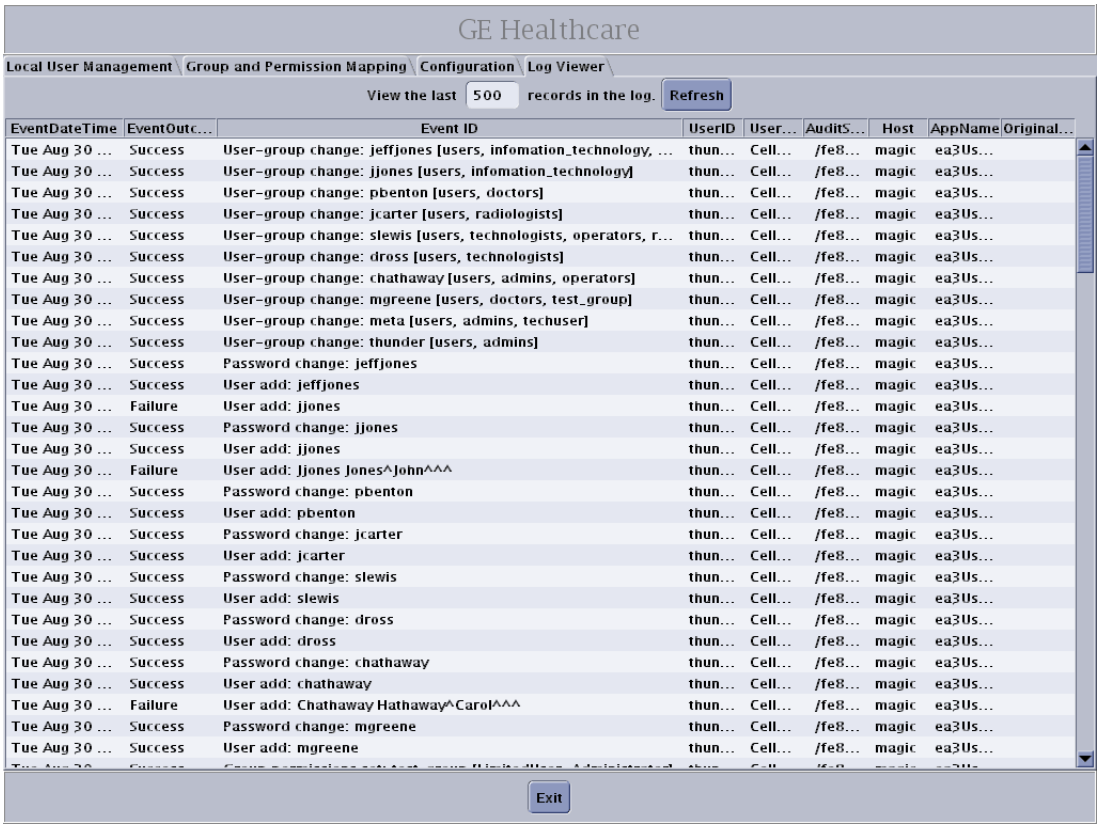
Viewing the Audit Log

The audit log provides information about who has accessed the system, when the system has been accessed, and the type of login (that is, emergency logins). The log settings are configured through the Configuration-Audit Log tab. Refer to Configure Audit Log (p. B-15) for more information.

Figure B-9 Log Viewer tab



EventDateTime	EventOutc...	Event ID	UserID	User...	AuditS...	Host	AppName	Original...
Tue Aug 30 ...	Success	User-group change: jeffjones [users, infomation_technology, ...	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User-group change: jjones [users, infomation_technology]	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User-group change: pbenton [users, doctors]	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User-group change: jcarter [users, radiologists]	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User-group change: slewis [users, technologists, operators, r...	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User-group change: dross [users, technologists]	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User-group change: chathaway [users, admins, operators]	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User-group change: mgreene [users, doctors, test_group]	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User-group change: meta [users, admins, techuser]	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User-group change: thunder [users, admins]	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	Password change: jeffjones	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User add: jeffjones	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Failure	User add: jjones	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	Password change: jjones	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User add: jjones	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Failure	User add: Jjones Jones^John^^^	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	Password change: pbenton	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User add: pbenton	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	Password change: jcarter	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User add: jcarter	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	Password change: slewis	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User add: slewis	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	Password change: dross	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User add: dross	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	Password change: chathaway	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User add: chathaway	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Failure	User add: Chathaway Hathaway^Carol^^^	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	Password change: mgreene	thun...	Cell...	/fe8...	magic	ea3Us...	
Tue Aug 30 ...	Success	User add: mgreene	thun...	Cell...	/fe8...	magic	ea3Us...	

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Administering System Configuration

The Configuration tab (Figure B-10) allows you to perform several tasks that effect how the login function works.

When the Configuration tab is selected, another row of tabs appears. The following sections describe the controls available for each tab.

Change Display Settings and Enable Enterprise Authorization

The Configuration-Configuration tab (Figure B-10) allows you to set the inactivity timeout period, control whether the Emergency Login button appears, and to enable enterprise authorization.

Table B-1 describes each function.

Figure B-10 Configuration-Configuration tab

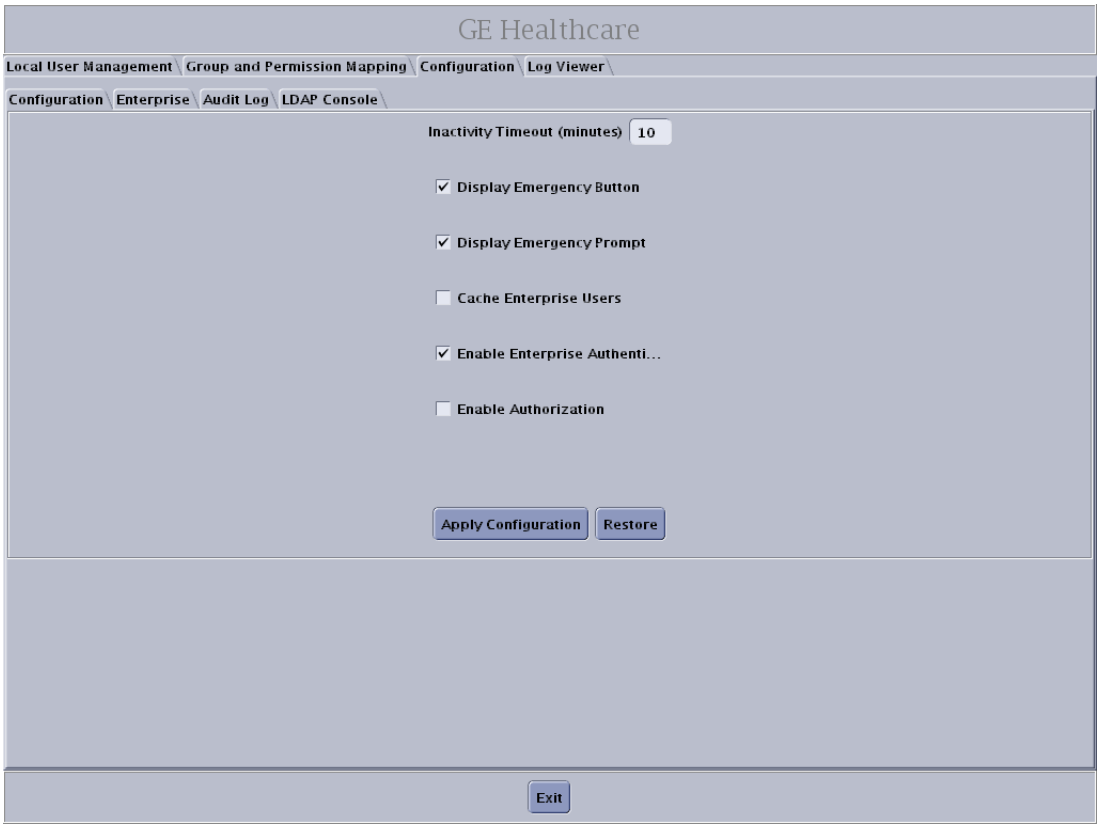

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Table B-1 Configuration function descriptions

Function	Description
Inactivity timeout	This function is not implemented for the Definium 5000. **IMPORTANT!:** Do not enable or change the setting on this function. Enabling or changing this function may cause conflicts with the system software. Sets the number of minutes before automatic logout will occur. For example, if you enter 10 minutes, the system will display the splash screen after 10 minutes of inactivity (no keyboard entry or mouse movements), requiring the user to log in. When logging back in, the system is returned to its last know state. To disable inactivity timeout, enter "0".
Display Emergency Button	Allows the Emergency Login button to be shown on the Login screen. If this button is not displayed, only those users with a valid account can log onto the system.
Display Emergency Prompt	When the [EMERGENCY LOGIN] button is clicked, displays a prompt that requires emergency users enter their names.
Cache Enterprise Users	Allows all users previously set up on the system to log in even if the site network is down.
Enable Enterprise Authentication	Verifies users and what privileges they have based on the network settings at your site.
Enable Authorization	For facilities with enterprise login, enables checking group membership before allowing users to enter the system. With authorization, you must add user groups to the group tab in order to let people log in.
[APPLY CONFIGURATION]	Applies the settings.
[RESTORE]	Restores the setting to the last applied configuration. That is, when the [APPLY CONFIGURATION] button was last clicked.

Configure Enterprise Authorization

The Configure-Enterprise Tab is used by the site's IT (Information Technology) or GE Service personnel. It provides connectivity to the site's user database. If you do not have a network established in your facility, this tab will not be used.

When the fields on the left side of the screen are completed, press [GENERATE DEFAULTS] to auto-populate the fields on the right side with suggested defaults. Modify the information as appropriate.

Press [APPLY CONFIGURATION] to apply the settings.

The [RESTORE] button resets the tab to the last saved settings.

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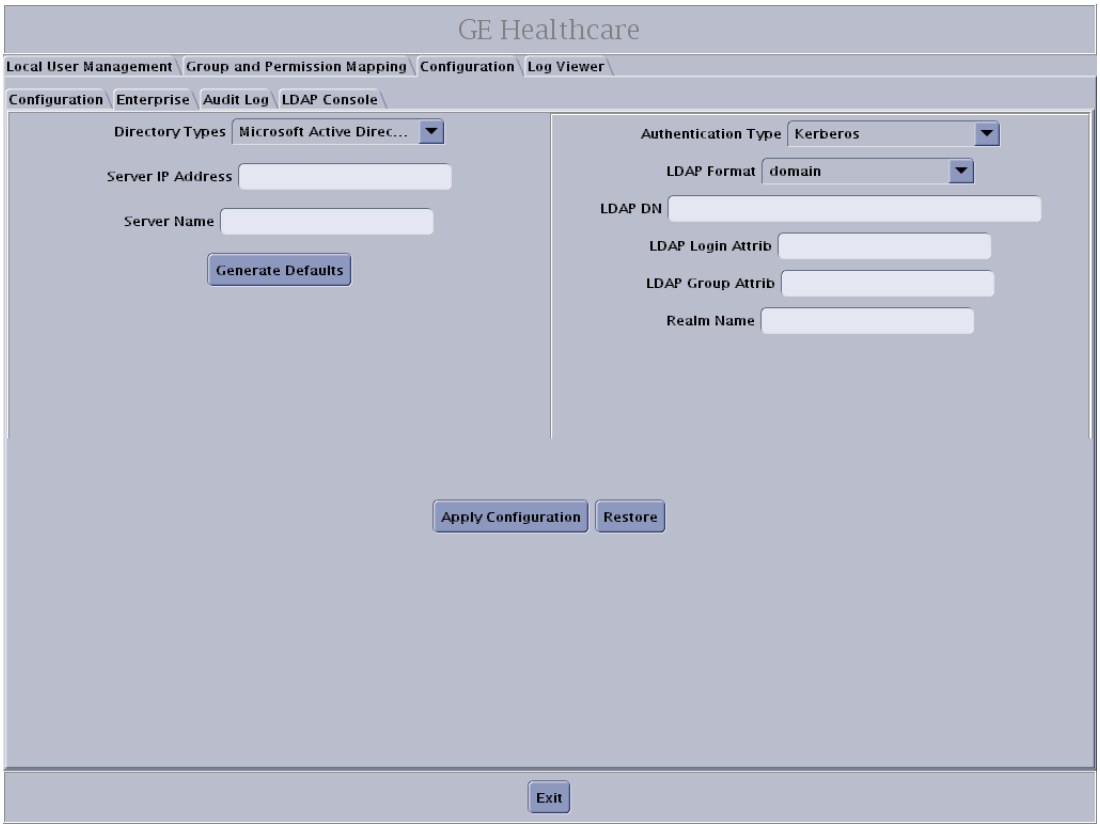
Figure B-11 Configuration-Enterprise tab



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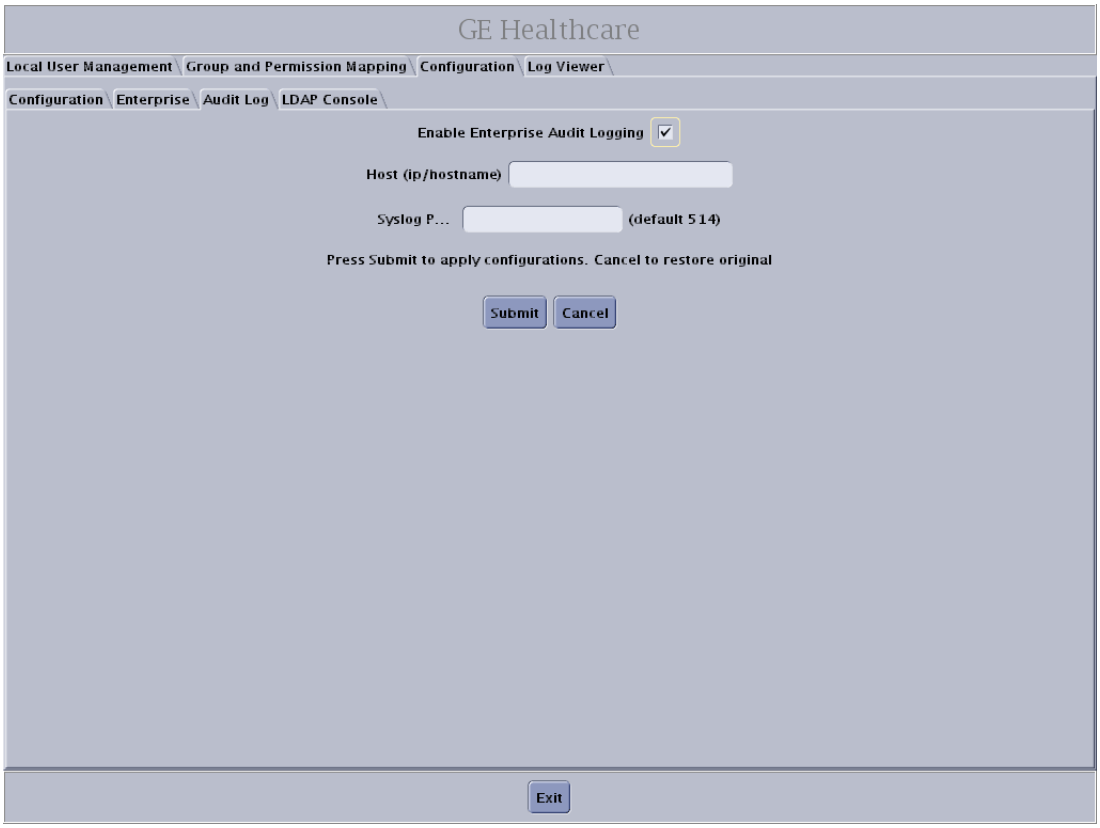
Configure Audit Log

If enterprise authorization is enabled, this tab controls if audit logging is to be enables, which hosts will be tracked, and the number of events to track.

Click [SUBMIT] to apply the settings.

Figure B-12 Configuration -Audit Log tab



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Use LDAP Console

Lightweight Directory Access Protocol (LDAP) functions are available from the Configuration-LDAP Console tab.

Figure B-13 Configuration-LDAP Console tab

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Appendix C: Technical Specifications

Topics covered include:

- Parameters and Ranges (p. C-1)
- Factors (p. C-2)
- Duty Cycle (p. C-2)
- Generator Accuracy (p. C-2)
- X-Ray Source Assembly Filtration (p. C-2)

Parameters and Ranges

Parameters	Range
kVp	From 40 kVp to 150 kVp on 1 kVp steps.
mA	From 10 mA to 650 mA through the following mA stations: 10, 12.5, 16, 20, 25, 32, 40, 50, 65, 80, 100, 125, 160, 200, 250, 320, 400, 500, 650.
mAs	Product of mA x Time values from 0.1 mAs to 520 mAs.
Exposure Time	From 1 millisecond to 2 seconds through the following time stations: Milliseconds: 1, 2, 3, 4, 5, 6, 8, 10, 12, 16, 20, 25, 32, 40, 50, 65, 80, 100, 125, 160, 200, 250, 320, 400, 500, 650, 800. Seconds: 1, 1.25, 1.6, 2.
AEC	mAs: 0.1 mAs to 512 mAs
	Exposure time: Nominal shortest irradiation time = 1 ms.
	Selectable factors: kVp and mA both have the same range as non-AEC mode. Changes in selectable factors will affect the exposure time and mAs.

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Factors

Factors	Generator SHF-635
Maximum Power kW	65 kW
Maximum mA	550 mA
Maximum kVp	150 kVp
Power Output (@0.1 s)	650 mA @ 40-98 kVp
	500 mA @ 99-128 kVp
	400 mA @ 129-150 kVp

Duty Cycle

18 exposures per hour at maximum mAs, using the X-ray tube: Toshiba E7254FX.

Generator Accuracy

Tube Voltage Range	X-Ray voltage range: 40kVp - 150kVp in 1 kVp steps Allowable deviation: +/- (3% + 1kV)
Tube Current Range	X-Ray tube current range: 10 - 650 mA (65kW) Allowable deviation: +/- (4% + 1mA)
Accuracy of Exposure Amount (mAs)	0.1 mAs - 520 mAs Manual mode maximum mAs limited to 520 mAs AEC mode maximum mAs limited to 512 mAs
Time of Exposure	1ms - 2000ms Allowable deviation: +/- (2% + 0.1ms)

X-Ray Source Assembly Filtration

The x-ray source assembly is made up of the x-ray tube and the collimator. Together, they provide permanent, non-removable filtration of 3.6mm aluminum equivalent @ 80 kVp.

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